RAILROAD GAZETTE

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Contributions.

Freight Train Speeds on the Northern Pacific.

Troy, N. Y., March 5, 1900.

To the Editor of the Railroad Gazette:

Mr. McHenry's article in the Railroad Gazette of March 2 suggests two questions, the answers to which are necessary to a completely clear understanding of the paper.

1. It is stated that on the Minnesota division-first district, a westbound speed of 18 miles an hour develops the full adhesion of the locomotive. The table given shows a combined grade and train resistance of 8,333 pounds at 18 miles an hour, or only a little more than one-seventh the weight on the drivers. In the second question it will appear that even this stated total resistance is too high, but if it is not, is it possible that one-seventh must be taken as the coefficient of traction? or is there another explanation of the difficulty? I have explained it to myself by assuming that the locomotive is loaded with the train it can just haul on the ruling grade of the district at some minimum speed, and that with this load it can just make an average speed of 18 miles an hour over the entire district. Is this the correct explanation? It is in accordance with the results obtained in my letter of February 2.

2. Are not the first four quantities in the "Total Resistance" column of Mr. McHenry's table in error? If not, why not? The quantities in this column seem to be made up of the products of the quantities in the corresponding lines of columns 2 and 4.

WM. G. RAYMOND.

Automatic Electric Switches.

McKeesport, Pa., Feb. 27, 1900.

To the Editor of the Railroad Gazette:

Will you inform me whether or not any tests have been made of automatic switches, i. e., those used for moving from one position to another the tongue of a trolley line switch? I am aware there have been a number of patents granted, for throwing a switch from platforms of cars, but do not know that any have been given a practical test.

J. BAILEY JOHNSON.

[Many electrically worked switches have had a practical test, but few have come into general use. Some of the patented devices are fundamentally defective in that they rely solely and directly on the attraction of electro-magnets to give the pull to move the tongue of the switch. The New York Switch & Crossing Co., Hoboken, N. J., makes electric automatic switches which are in use at Hoboken, N. J.; Richmond, Va.; Brooklyn, N. Y., and at other places. They have worked satisfactorily in Brooklyn at the corners of Fulton street and Putnam avenue, Halsey street and Nostrand avenue, and Navy street and Park avenue. The mechanism complete, ready to be hitched to the tongue of a switch, costs $225. The principle on which it works is as follows: Electro-magnets, in the return circuit of the car motors, furnish the necessary power for moving a lever, which is attached to the tongue of the switch. The track carrying the return current has just before the switch point an insulated section connected by wire with the electro-magnets in a cast iron switch box which is fastened to the cross ties and buried so that the top is level with the road bed, and the cover can easily be removed for inspection or repairs. While the car is on this insulated section, a movement of the handle of the controller sends a current through the coils of the magnets and the tongue is thrown over. The details of the mechanism for doing this can be obtained from the makers. If, however, the switch is in the desired position when the car approaches, the current is turned off by the motorman and the car coasts over the short insulated section. Should the device fail to work, the tongue can be moved by an iron rod in the usual way.—Editor.]

The Theory of Velocity Grades.

To the Editor of the Railroad Gazette:

Your recent discussions on "The Theory of Velocity Grades" seem to have come to a somewhat untimely end. Kicker's argumentative forces have apparently been unable to withstand the fire of Mr. Herr's data in the hands of Mr. Wentworth. Still, K. has left a considerable stock of animation, but only a little ammunition. His only hope now of proving that traction is independent of speed is to bring to the front such an array of figures to prove his point that even the results thus far printed will be overshadowed by weightier arguments based on observed facts. That this can be done is highly improbable, but barely possible. But Kicker does not desire to even appear to defend a position that is not sound, and frankly admits that Mr. Wentworth has brought out pretty thoroughly the fact of varying traction—the most important truth established in the controversy.

I write to urge the further discussion of the important point raised by Kicker on page 113; which, in effect, is that Mr. Herr's results were for traction "sustained continuously," and are not typical of conditions on velocity grades where the engine is worked pretty hard for a short time. This seems to be the turning point of the discussion in its present stage.

It may not here be out of place to suggest that Mr. Wentworth give an explanation of how his tractive force expression—which has so far withstood all attacks—was obtained. He has indicated how it agrees with modern practice, and has apparently established his claim made in his first article of Dec. 8 last, that an empirical expression for the traction that may be reasonably expected from an engine of given weight on driving wheels moving at a given speed, can be safely used in such formulas as Mr. Wentworth established.

He well said in his first letter that an accurate expression for tractive force must necessarily include not only the governing dimensions of the engine, but also a combined expression for the personal equations of the engineman and the fireman, and the coal used. Further, it may be said that, could such a theoretically correct expression be obtained for a given engine and under given conditions, it would be useless when the conditions changed. Still, it is well to note that the theoretical expression first used in the discussion by Prof. Raymond, $T = 375$ I. H. P. $\div$ S, has stood some severe tests and still it stands.

In fairness to Professor Allen, I think it should be said that his article of Jan. 12 on "Momentum Grades" did not enter into the question of the proper amount of traction or of train resistance at various speeds. Since any tractive force formula could be used with his treatment, it seems to me he has been dragged unceremoniously into a controversy in which he properly has no part.

Prof. Raymond added much to the discussion when he generalized Wentworth's seventh formula (Railroad Gazette, December 8 last), which gives the length of track (L), in stations of 100 ft. each, in which the speed varies from S_1 to S_2, putting it in the form:

$L = \frac{4}{3} \frac{(S_1 + 10)\ (S_1 + S_2)}{R + 20\ G.}$, which does not contain the weight on the drivers, nor indicates any negative value for L.

As far as I can make out, Mr. Wentworth has assured us that it is easier and safer to use the formulas which he has established than to solve problems in velocity grades by reasoning each time from the first principles. If the discussion, already very profitable, could conclude with further explanation of the new tractive force formula and an answer to Kicker's query, we might get a step closer to the correct theory or theories of velocity grades and make the whole subject a little more practical.

A. W.

The Tractive Power of Two-Cylinder Compound Locomotives.

To the Editor of the Railroad Gazette:

An examination of the formula for computing the tractive power of two-cylinder compound locomotives given by Mr. C. J. Mellin in your issue of Feb. 16, 1900, page 100, leads to the conclusion that a more extended explanation is needed on the following points:

1. It is not at all clear what is meant by the symbol "f," which is defined as "compression in high-pressure cylinder."

2. What is the course of reasoning that gives the final volume of the steam as equal to the displacement of the low-pressure piston plus the clearance in the high-pressure cylinder minus the compression in the high-pressure cylinder as shown in the formula for the ratio of expansion? This formula is

$$N = \frac{A + a\ (b - f),}{a\ c + a\ (b - f)}$$

where N = number of expansions, A = area of low-pressure cylinder, a = area of high-pressure cylinder; b = clearance in high-pressure cylinder, f = compression in high-pressure cylinder, and c = cut-off in high-pressure cylinder.

3. In view of the results obtained by altogether neglecting b and f, why are they introduced in the formula? Taking the data in the example given by Mr. Mellin, viz.: an engine with cylinders 21 and 33 by 26 in., boiler pressure at 200 lbs. per gage, back pressure at 15 lbs., c = 85 per cent., b = 8 per cent., and f = 2 per cent., his formula gives N = 2.81, and from this by the well-known formula,

$$P_1 = \frac{P\ (1 + \text{hyp. log } N)}{N} - 15,$$

$P_1 = 140.5$ lbs.

In the example given by Mr. Mellin, the areas of the pistons are taken as 850 sq. in. and 340 sq. in., respectively, which areas are 5 or 6 sq. in. less than the areas corresponding to the diameters and were doubtless so taken as round numbers representing the average effective areas, considering the piston rods.

Now, if we take the total number of expansion as the displacement of the low-pressure piston divided by the displacement of the high-pressure piston up to cut-off, we have (using Mr. Mellin's nomenclature) $N = A \div c\ a = \frac{850}{.85 \times 340} = 2.94$. Substituting in the formula for P_1.

$$P_1 = \frac{215\ (1 + 1.0784)}{2.94} - 15 = 137 \text{ lbs.}$$

The difference between 140.5 lbs. and 137 lbs. is 2½ per cent. of the larger number, and when the factor 80 per cent. is introduced to get the "actual average pressure," the difference is only 2 per cent. Inasmuch as the factor 80 per cent. is assumed, it seems that the value of 137 for P_1 is well within the limits of error.

D. R.

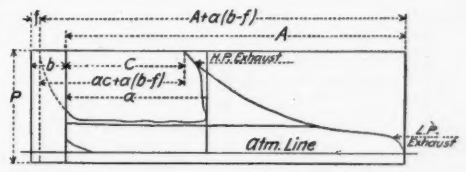
Richmond, Va., March 10, 1900.

To the Editor of the Railroad Gazette:

Replying to D. R.'s remarks [above] as to a more complete explanation on certain points in my notes on tractive power of compound locomotives in your issue of Feb. 16, 1900, I beg to say:

First.—The symbol f will be defined as if the compression in the H. P. cylinder should be carried up to the initial pressure line, shown in dotted lines on the accompanying sketch. Second.—Considering the engine to consist of the L. P. cylinder alone, with the volume of steam used up to the cut-off in the H. P. cylinder to be expanded throughout the L. P. cylinder, the L. P. clearance and compression should be taken into the formula. But, as the final volume under such circumstances should be taken only up to the point of exhaust and in order to simplify the formula, we start at the point of the initial volume, the L. P. clearance less the compression is compensated for by the corresponding proportions of the H. P. cylinder, plus the volume displaced by the L. P. piston from the point of exhaust to the end of the stroke.

We get, then, only one starting point for both volumes, and also a definite termination of the final volume at the end of the stroke of the L. P. piston, as indicated in the sketch.



Third.—It is merely a matter of the accuracy desired whether or not you neglect a (b — f) in the formula; but if the errors in both cases are on the same side of the actual condition, the error will be increased by excluding it from the formula by the 2½ per cent. difference in the results.

The 80 per cent. constant which I used in the formula is not merely an assumption but is based on actual observations. The different losses due to wire drawing of the steam in ports and passages, etc., combine to make up the gap which cannot be ascertained with any degree of accuracy by any other method than actual investigation of the performance of a number of engines.

C. J. MELLIN.

Pipe Galleries in New York.

The project of building galleries in connection with the new rapid transit tunnel in New York City, in which to put sewers, water pipes, gas pipes and electric conduits, is receiving a good deal of attention. So far as the public is concerned the matter was first brought forward by the New York Times, which enterprising journal has produced a good deal of

useful discussion of the subject. What follows is a short article written for the Times by Mr. Stevenson Towle, M. Am. Soc. C. E.:

Few persons are aware of the vast network of sewers, water and gas pipes, conduits and other underground fixtures, underlying the street pavement, which will be encountered in the construction of the rapid transit tunnel. Their number and location are not definitely known even to the city officials having charge of them, or even to the owners of them. How to dispose of them is a serious question, not only for Contractor McDonald, but for the city and the corporations owning them. The tunnel contractor is only required to remove and place them in the space within the street not occupied by the tunnel. The only space available will be on both sides of the tunnel to the curb or vault lines, and between the top of the tunnel and the pavement.

The sewers, water, gas and steam pipes, subways, pneumatic tubes, and other conduits in this limited space will have to lie so close together that it would be impossible to get to them to make examinations and repairs. Repairs will be frequent, as it is impossible to guard against settlements, no matter how carefully the earth in this space containing the conduits has been replaced. Leaks are sure to occur. The leakage from the sewer and water pipes might weaken the foundations of the tunnel, and possibly of the adjoining buildings. The destructive power of gas leaking into a space such as the tunnel or house cellars, is great, and the consequences that would follow from an explosion might be even more than those which recently happened in the Boston rapid transit tunnel from the same cause, when many lives were lost.

The Rapid Transit Commissioners foresaw this danger, and in the first plan for the tunnel adopted by them made ample provisions and safeguards for all pipes and conduits in well-designed galleries, as shown in the accompanying sketch.

Unfortunately for the city's interest and safety, this plan was not sanctioned by the courts, for the reason that the galleries were not necessarily a part of the railroad proper.

The necessity for pipe galleries remains, and the responsibility of the city is not lessened that they were not built with the tunnel. It is still the duty of the city to secure the safety of this great work and the comfort and health of the people. This can be best accomplished in the way the Rapid Transit Commissioners originally contemplated. It is not too late to build these galleries in conjunction with the construction of the tunnel. The cost should be but little more than if built as originally planned, and far less cost (at least one-half) than if built separately after the tunnel has been built. The tunnel and galleries should be built together, not only for sound engineering reasons, but for the sake of economy. This could be done by simply extending the tunnel a little wider on each side, and partitioning the galleries from the tunnel space by an inexpensive partition wall. These galleries can be perfectly ventilated and lighted, and kept always free from gases, and easily accessible for repairs to the sewers, pipes and conduits by stairways and openings on the side streets.

This question should be decided at once and before the contractor has made his contracts for doing the work as now planned. The Rapid Transit Commissioners have the right to make this change and complete the tunnel as originally contemplated by them under the provision of the contract as extra work, and I cannot see the necessity for additional legislation, as the act authorizing the railroad contemplated a complete tunnel, and the tunnel is not complete without galleries for the proper disposition of the public sewers and water pipes it has removed and destroyed.

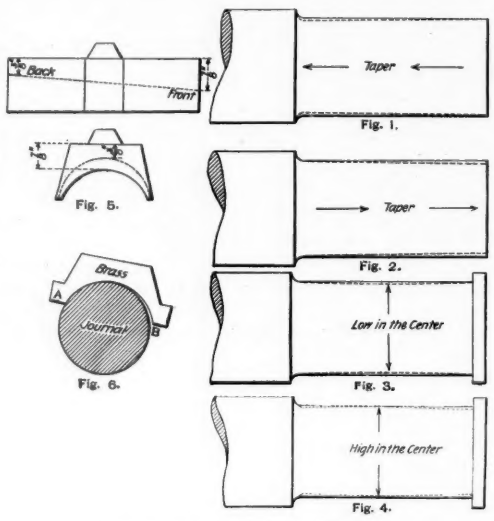
Lubrication of Car Journals.

The lubrication of car journals is a very important factor in the successful operation of through passenger trains on any railroad, and the problem becomes a study in itself when more than 3,000 journal boxes have to be taken care of daily, and a large percentage of these boxes make a mileage of 2,000 miles before they return to the starting point, or where they had been prepared. There is an accumulation of the worst conditions, and these conditions must be met and the cars put in proper shape for another trip. Several important factors are involved in this question.

The journal box lids are often improperly closed at different points along the road and the waste at the front and sides of the boxes is found covered with sand or grit, and these lids cannot be cured easily. There is, however, one dust-proof journal box lid in use—the one used on the journal box in the No. 5 Pullman truck. This lid is dust-proof when it is properly fitted, and it is safe to say that it is the only satisfactory lid in this respect in service to-day. But we still have an element of danger in the dust guard; and there is not an entirely satisfactory dust guard in the market to-day. I have, however, some recollection of seeing a dust guard described in the Railroad Gazette some time ago, designed by Mr. Symington, Superintendent of Motive Power of the Atlantic Coast Line, which I think approached closely to the "ideal dust guard." There seems to be a wide field here for some one to design a dust guard which will accomplish the purpose more successfully than those now in use, and I do not know of anything about about a car which fulfills its purpose more imperfectly than a dust guard, unless it is the average journal box lid.

The crude construction of car trucks has been so thoroughly discussed that it seems out of place to say anything on this subject at this late day, but a few remarks made from actual observations along this line will not be amiss. The shop practice in car building is not entirely what is desired and this especially applies to repaired cars, as it seems to be the impression in some shops that rough castings fastened together with rough bolts do not require to be fitted to any particular lines, and that an aggregation of bad fits and bad alignments will counteract each other, and any weakness that may develop in service will be taken care of at the repair yard. The man in charge of this department is the one who knows by direct observation the evil effects of such work.

There are cars running to-day under which iron axles are found, and in a large number of cases the history of these journals is that they had at some previous date given trouble from heating, and when they were removed, the journals were found to be full of short open seams, showing that the more or less imperfectly welded fibers had begun to separate, and there is no doubt that these journals began to develop seams very soon after they had been placed in service. The experience with iron axles under passenger equipment cars seems to be that the journals will run entirely satisfactorily and give fairly good results as long as they are running against the lead lining on the brass; but just as soon as this is worn off heating begins and abrasion of the metal takes place, which accumulates to such an extent as



Wear of Car Journals and Bearings.

to cause both the journal and brass to become overheated and softened, when the two metals will actually weld themselves together. Such conditions are beyond the aid of any lubricant.

When a journal becomes heated from whatever cause, the heat accumulates very rapidly and both the journal and brass are able to absorb a large amount of this heat; but they are unable to free themselves of it sufficiently fast to prevent overheating, and unless the oil can be lavishly supplied, there is abrasion of the metals, and a rough brass and a cut journal is the result.

Figs. 1 and 2 show the manner in which journals wear under one class of cars and in the same truck, and it will be noticed that in Fig. 1 the greater wear is at the fillet end, while in Fig. 2 the greater wear is at the outer end.

Fig. 3 shows the journal wear which is characteristic of another type of truck, and is probably due to the journal being longer than the brass, and the brass runs the greater part of the time centrally, so that there is not much wear at the extreme ends of the journal; but it is apparent that there would be a very much reduced area of rubbing contact if the old brass should be removed and a new one applied.

Fig. 4 represents the journal wear of still another type of truck, and in nearly every case where this sort of journal wear has been observed the top of the brass, or stop wedge, was made with a radius in the same plane as the journal, and the load on the journal could conveniently change from the front end to the back end of the journal, which resulted in wearing the journal as is shown.

Fig. 5 represents the wear of a brass which is used on the journal shown in Figs. 1 and 2, which will be readily understood from the sketch.

Fig. 6 shows the manner in which a bearing is worn when the journal box is badly "upset" in the pedestal, due to worn conditions. The side of the brass marked A is worn away much more rapidly than the side marked B. The conditions represented in the last two figures are a prolific cause of hot journals. The dotted lines in all the figures represent the wear lines.

Defective journal brasses are also a prolific cause of hot journals, and while the condition is embodied in the specifications for journal brasses that they much contain certain percentages of the various constituent metals, nothing is said about the preparation of the lead lining, or about the boring of the brass previous to its being lined.

To obtain good results from lubrication, it is important that there are no mechanical defects in the journal box, stop wedge, dust guard, journal box lid and journal, and that the equalizers have a proper bearing on the top of the journal box and also that the several parts of the truck are in proper alignment. It should be the practice at all well regulated shops in which repairs to passenger equipment cars are made, to remove the waste from all the journal boxes and the good portion be re-saturated, and the boxes re-packed with good, well saturated waste. The journal boxes should also be thoroughly cleaned inside and the brasses and stop wedges inspected before being applied.

The question of economy in car lubrication does not lie in the money that the oil costs, but rather in what it is able to perform. A good car oil for the lubrication of passenger cars should have approximately a uniform consistency through the different seasons and possess just enough viscosity to be adhesive, and the vaporizing point be such as to be able to take up and radiate into space the accumulating heat. Cooling compounds are very often made use of at outlying points, but when the car arrives at the terminal point the box should be thoroughly cleaned out and the journal examined, as it may be cut, notwithstanding that it had arrived perfectly cold. The box should be then repacked with good clean waste.

These compounds as a rule consist of a petroleum product, plumbago, which contains a percentage of mineral matter, a hardening product, tallow or other saponifiable oil and a volatile substance, probably water. The philosophy of the material as applied to a hot journal is that the heat is rapidly absorbed on account of its low vaporizing point. This is exactly what takes place when a candle or soap is applied to a hot journal. It has been found by actual experiments made on the road, and in laboratory tests, that the friction is higher with a grease than with oil, and also that the wear of the journal is greater with grease than with oil. This is due to the fact that all cooling compounds contain more or less mineral matter, such as oxide of iron, silica or ground rock, and I think that it is the experience of the railroads today that they feel disinclined to use plumbago or any other inert matter in a lubricant, on the ground that pure plumbago is not put on the market for this purpose, and it is likely to contain a percentage of mineral matter which grinds out the journals, but it will keep the journals cool.

Another important factor in the operation and care of passenger cars is the co-operation of the Transportation Department, and the question of hot journals should be carefully considered by that department; it to communicate with the Mechanical Department, which should analyze each case if possible and get at the cause and remedy. The Transportation Department should instruct the trainmen to obtain in every case so far as their judgment is concerned the true cause for the hot journal on the road, as there are a great many causes which can produce this other than an absence of oil. The criticism of dry waste gets to the ears of the oilers and they imagine they are going to lose their jobs, and they begin at once, unless carefully watched, to deluge the journal boxes with oil. This sort of practice has been proved to be extravagant and useless, as correctly kept records have shown that in a large number of cases where there was a large reduction in the consumption of oil, there was also a corresponding decrease in the number of hot journals, as the boxes then received more attention and less oil.

What is desired most to-day, to help decrease the number of hot journals, is the concurrence of opinion among Master Mechanics, which will be a step toward a higher standard of repairs to the substructure or trucks of both passenger and freight equipment cars. S. J. D.

The Work of Railroad Men on the Problem of Pure Water for Steam Boilers.

By C. Herschel Koyl.

I.—The Investigation.

It has been my duty of late to study the state of the art of water softening and purification, to learn the history of its development, and to trace the successive steps by which the art has reached its present very satisfactory condition. In doing this, I have been much impressed by the fact that nearly all that has been accomplished in this country, both in studying existing water conditions, gathering the chemical knowledge necessary to a solution of the problem, and in developing this knowledge to the condition of an art, has been due to the continued and untiring efforts of a body of representative railroad men.

We have found by many experiences the benefit of combined and systematic study, and of bringing to bear upon a tangled question the experience and knowledge of many men working under different conditions. Results of such work are evident in the accomplishments of the Society of Civil Engineers, the Society of Mechanical Engineers, various associations for the discussion of railroad questions, and,

in the case of the water-softening problem, conspicuously so of the American Railway Master Mechanics' Association.

By the happy division of scientific workers into those who devote themselves to the study of pure science and those who devote themselves to the application of scientific knowledge to the wants of life, we have developed on the one hand the physicist and the chemist, and on the other hand the civil or mechanical or the chemical engineer. Sometimes the engineer versed in a special branch of pure science finds recognized problems without number awaiting the application of his knowledge, and sometimes the advance of pure science has been so great in special directions that it precedes by years the problems to be presented. In the case of pure water for industrial purposes, the problem had become pressing and important before the theoretical knowledge necessary to its solution had become available.

By the term industrial water I mean water for boilers, water for washing and the laundry, water for all the ordinary purposes of life, including drinking water. But since the problem of softening and purification is almost the same for all these purposes and varies only according to the character of the water presented, the researches, the discussion and the remedy of the American Railway Master Mechanics' Association will be found applicable to nearly all cases.

The question set by the Master Mechanics' Association was brief, but all-important and far-reaching—"How Shall We Secure Pure Water for Our Locomotives?"

The Committee appointed by the Association at its third annual meeting in the year 1870 consisted of the following men: H. A. Towne, H. & St. J. RR.; J. M. Boon, P., F. W. & C. RR.; C. O. Marston, I. C. & L. RR., of whom Mr. Towne remained for several years a member of the Committee, and I think that all the other men (and they have been both many and able) who have served on the Committee during the past thirty years, will acquiesce in recognizing Mr. Towne as the pioneer in the subject.

This Committee set itself first to gathering information from different parts of the country as to the difficulties experienced with boiler water therein. The information was intended to show, first, what parts of the country furnish impure water; second, the character of the impurity—whether the water produces hard scale in the boiler, or a soft muddy scale, or pits the boiler and produces leaky flues; third, to what extent this takes place on different roads and what is the amount of damage in dollars and cents per locomotive per year.

The method of investigation was that now most frequently used by scientific men, a series of questions sent to the Master Mechanic of each road with a request for a specific answer to each. The first questions were sent out in the year 1870 and the first answers were received and presented at the meeting of the following year. At this and successive meetings much information was added by the complete discussion of the subject before the Association; and the results obtained are well worth recapitulation.

Outside of some parts of New England and some parts of the Middle South, there are very few places in the United States where pure, soft water can be had for locomotive boilers. In the limestone regions the water is loaded with dissolved carbonates of calcium and magnesium (magnesium being nearly always present); in some States, such as New Jersey, the water carries large amounts of dissolved sulphate of calcium (gypsum); in some States, such as Utah, the water is impregnated with chlorides of calcium and magnesium; while in others, for instance on a line running far South through the Dakotas, the water has so much free alkali and suspended matter that it foams in the boiler whenever the work is hard and the boiler is being forced (which is generally the case on a railroad); in may localities also much fine mud and silt are in the water.

The Committee accumulated evidence to show that the carbonates and sulphates of calcium and magnesium are always deposited in the boiler when the water is heated to the temperature of working steam, not because the solution becomes concentrated but simply because it becomes hot. There was information also to the effect that the scale left by muddy water, while more easily washed out of the boiler and less harmful per se, is frequently of great damage because, on account of its softness, it is despised and allowed to accumulate until the iron of the boiler is burned.

It was found, however, by this Committee that in some parts of the United States there is practically pure water, and that boilers fed with such water are found to be in good condition after from twenty-five to thirty years' continuous service, while boilers fed with any of the waters producing hard or soft scale must be almost completely renewed in most of their parts every four or five years, and some much more frequently.

When this Committee of the Master Mechanics' Association came to the question of the money value of the damage done by these polluted waters a most valuable series of results was obtained, and I doubt whether in any part of the world such a comprehensive, well-founded, conclusive, clear and definite determination has been made of the annual loss to railroad revenues due to bad water.

The method of computation was of the utmost value and conclusiveness because of its simplicity and directness. The Committee gathered statistics showing the average cost of boiler repairs in parts of the country supplied with pure, soft water, and the corresponding costs in parts of the country supplied only with hard or muddy water. The difference between these was naturally considered to be an approximate statement of the increased cost of locomotive repairs due to hardness and other impurities in the feed-water.

In a similar manner the Committee gathered statistics of the amount of fuel used in the hard water sections for say a month, while the boilers were coated with scale, and for a month immediately after they were cleaned and the scale deposit therefore was light and thin. The difference between these two gave an approximate idea of the waste of fuel due to the presence of scale.

The mass of statistics collected forms most interesting reading to anyone who is studying the subject, but is too elaborate and long for such a paper as this, and I give the summation only.

The Committee, from data such as above, computes the cost of additional boiler cleaning as about $50 per locomotive per year; the cost of additional boiler repairs, due to incrustation alone, as about $360 per locomotive per year; the cost of additional fuel used (at $2.50 per ton) as about $340 per locomotive per year; making a total of about $750 per locomotive per year as the average expense due to the use of bad water. Just think of the far-reaching import of such an investigation and conclusion. The character and the method of the investigation were of the highest class, the conclusion is indisputable. The average amount of money drawn from the railroad treasury by the use of bad feed-water, on most of the railroads of the United States, is $750 per locomotive per year.

There are in the United States about 35,000 steam locomotives. About 20,000 of these are in active service in such localities as come within the Committee's list of locomotives using bad water. A simple multiplication shows that with 20,000 locomotives, each using $750 per year, there is a total of $15,000,000 annually used to repair the damage done by hard or dirty water.

The total annual amount of dividends paid on railroad capital stock in the United States is less than $100,000,000, and if $15,000,000 expense can be saved it may increase the annual dividends by somewhat more than 15 per cent. No wonder that the American Railway Master Mechanics thought they were doing their duty in spending time and labor in the effort to reduce the annual expenditure of this $15,000,000, a very large part of which has become, through the persistent efforts of this same Master Mechanics' Association, no longer a necessary, but a needless expenditure.

In another article I shall endeavor to summarize the conclusions reached by the Association in the matter of a remedy.

Electrical Indicators in the Boston Subway.

The traffic at the Park Street station of the Boston subway is greater than at any other station on the underground system. The west (or outer) side of the southbound platform at this station is used for the cars from the northern end of the city bound for points reached by Tremont Street and Shawmut Avenue. The number of persons taking these cars is not sufficient at any time to cause trouble in loading and no special means are necessary either as safeguards or to facilitate the handling of the traffic. The east (or inner) side, however, is served by cars which make this station their terminus and which, after discharging their inbound freight on the opposite platform, pass around a loop and come to the southbound platform empty. This side of the platform is arranged with five stopping places, or "berths," for the cars, designated by figure numbers on the vertical columns, No. 1 being at the southern end of the platform. During the busiest time of the day, from about 5 to 6.30 p. m., more than 6,000 passengers an hour use this side of the platform, and various means have been adopted both to prevent accidents and to hasten the handling of the crowds. One of the most serviceable devices to aid in this is the electric indicators or signboards at A and B, Fig. 2, by means of which the passenger is notified from 45 to 90 seconds in advance at which section or "berth" his car will stop.

It is said that the cars coming to this side of the platform run over from 25 to 30 routes. All of these leave the subway by way of Boylston Street. Not far from that point there are two general divisions of traffic, one via Huntington Avenue and one continuing on Boylston Street; and each of these is again divided, the Huntington Avenue lines into those going east and southeast over Massachusetts Avenue and those continuing on Huntington Avenue, and the Boylston Street lines into those for Brookline and Brighton and those for Cambridge, Arlington, etc. This fact is used in the construction of the indicator, where the names of the routes belonging to each of the four subdivisions are grouped vertically in a column by themselves, the space devoted to each route being 7½ in. by 25 in.

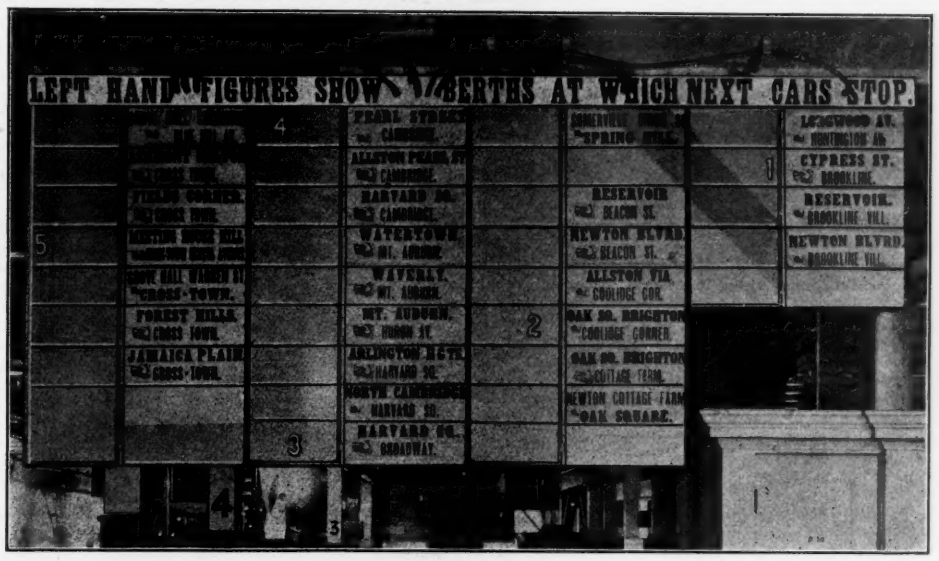


Fig. 1.—Electrical Indicators at the Park Street Station, Boston Subway.

Each space on the board for each route has at its side five compartments, each compartment containing an incandescent lamp. The front and back of the series of compartments are covered with glass painted black, except that the form of the figure, 1, 2, 3, 4 or 5 is left transparent. The relative position of each figure will be seen in the engraving from a photograph of one of the boards, Fig. 1. The exterior of the glass is covered with a thin coat of white paint, the result being that when the lamps are not lighted, nothing is visible at the side of the route except a plain white surface, but when any lamp is lighted a number shows through the white paint.

Within the space formed by the loop (Fig. 2) has been erected a tower, or "pulpit," as it has been called, containing a switchboard which communicates with all the compartments in the indicator. In this tower is stationed a man who can see both the incoming and outgoing platforms, and who knows at what "berth" at the outgoing platform an inbound

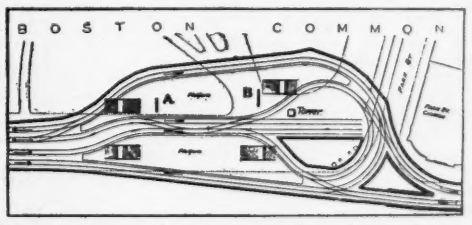


Fig. 2.—Loop at Park Street Station, Boston Subway.

car ought to stop. By means of electrical connections, he shows on the indicator the figure number opposite the proper route, and inasmuch as the indicator board is arranged to be read on both sides, the motorman, when he approaches the outgoing platform, sees at what "berth" he is scheduled to stop.

The indicators cannot be easily read within a space extending two or three feet from the edge of the platform, and this tends to keep the passengers from the extreme edge of the platform, thereby eliminating an element of danger.

The American Railway Engineering and Maintenance of Way Association.

The first annual meeting of this organization was held March 14 and 15, at Steinway Hall, Chicago, commencing at 10.30 o'clock Wednesday morning with about 150 in attendance. The first session adjourned about 2 o'clock in the afternoon, when the Atchison, Topeka & Santa Fe furnished a special train for a trip along the Drainage Canal to Joliet, where the re-rolling rail mill, using the McKenna process, was visited. On the second day two sessions were held and, in all, reports from 14 standing committees were received and discussed, the reports in general being outlines of the proposed work of the committees. The treasurer reported a net balance of $3,038. Thursday evening the meeting concluded with a dinner at the Victoria Hotel. The following reports are referred to in the order they were presented:

Yards and Terminals.

The committee consists of A. W. Sullivan, General Superintendent, Illinois Central; F. E. Paradis, Chief Engineer, Chicago Terminal Transfer; J. W. Thomas, Jr., General Manager, Nashville, Chattanooga & St. Louis; I. G. Rawn, Baltimore & Ohio Southwestern; E. E. R. Tratman, Engineering News; R. B. Tweedy, Chief Engineer, Wisconsin Central; S. P. Hutchinson, Superintendent, Pennsylvania R.R.; J. B. Cox, Chief Engineer, Chicago Junction; C. W. Hotchkiss, Chief Engineer, Chicago Transfer & Clearing Co.; C. S. Sims, Jr., Engineer Maintenance of Way, Pennsylvania Lines, and W. S. Kinnear, Principal Assistant Engineer, Michigan Central.

It was brought out in the discussion that it was proposed to put in accessible form as much information as possible regarding freight yards; upon which could be based an intelligent discussion of such questions as the number of tracks which can be economically worked from one lead, the ratio of leads to yard tracks, the direction of the axes of the yards to main tracks, and the best grades for gravity yards. Mr. W. C. Cushing, of the Pennsylvania Lines, suggested that useful relations might also be established in percentages between the capacity of sub-yards to receiving yards, and Mr. W. G. Curtis, Southern Pacific, thought these things should be put in the form of specifications for different kinds of yards. In addition to recent increases in train length, making enlargements of yards necessary, the question of speed was becoming of such importance that yards must also be arranged with a view to avoiding delays to cars in transit. Regarding grades for gravity yards, Mr. C. S. Churchill, of the Norfolk & Western, said that under conditions existing on that road .8 per cent. grades were required; that road, having a large coal traffic, had avoided increasing its yards by adopting larger capacity cars. The Pittsburgh & Lake Erie has gravity yards where the main portion is a .2 per cent. grade, with heavier grades on the leads. Other topics suggested for the consideration of the committee were the design of shop yards and yards in small cities, and under what conditions in the latter places it is economical to make freight houses two stories. Attention was also called to the common practice of building long team tracks to hold from 20 to 60 cars, where, if some cars are unloaded quickly, they cannot be removed without interfering with the unloading of adjacent cars. To avoid this some have arranged team tracks in pairs, making them short spurs from a lead having capacities of from six to ten cars each. The proper location of track scales was also thought to require attention.

Graduation.

This committee consists of J. B. Berry, Chief Engineer, Union Pacific; W. McNab, Assistant Engineer, Grand Trunk; J. A. Atwood, Chief Engineer, Pittsburgh & Lake Erie; R. C. Barnard, Engineer Maintenance of Way, Pittsburgh, Cincinnati, Chicago & St. Louis; G. M. Brown, Chief Engineer, Flint & Pere Marquette; H. Baldwin, Engineer Maintenance of Way, Cleveland, Cincinnati, Chicago & St. Louis, and C. Dougherty, Roadmaster, Illinois Central. Extracts from the report are as follows:

After arriving at a decision on the best form of roadbed under ordinary circumstances, for the respective classes of material with which embankments are constructed, or through which the railroad passes in cuttings, consideration will be given to the question of a too rigid adherence to standard or stereotyped plans in localities where, from special surroundings, or local peculiar circumstances, modifications should be made.

Protection of Slopes.—The permanent character of cuttings and embankments being such an important element in maintenance, an investigation will be made regarding the immediate and extraneous causes which necessitate protection. Effective drainage being the fundamental element of protection to slopes, the methods for such will bear upon the character of the soil and the source and quantity of water to be taken care of. The contour of the slopes of cuttings and embankments, with reference to the shapes ultimately taken by natural causes, will be investigated, in order that the general practice of angles in intersecting planes may be modified advantageously.

Notes will be made on the friction and cohesion of soils in reference to the theory and practice of retaining walls, and, in regard to the latter, their various styles, method of construction, and materials of which built—masonry, piling, wooden wharfing, etc.; and instances in which each of these methods may be used to advantage, and the particular provisions that will be best to make with reference to their foundations, drainage, etc., will be dealt with. Not only will the question of retaining walls in cuttings and embankments to prevent landslides be investigated, but also the protection of embankments from scour by water in large volumes, either by current or waves—including rip-rapping, revetments, paving, etc., and the best plans to be adopted to meet them in a general way. In this particular, the committee hopes to be assisted by descriptions of particular cases.

Improvement of Grades and Alignment.—In the earlier days, on the more important railroads, the question of ultimate cost of maintenance and operation does not seem to have been as important a factor as that of shortening the line between the main points.

Consideration will be given to the features in which a new location may be preferable to improving the present one; also to particular cases of reduction of curvature as well as that of gradients, in both of which latter cases more or less new location may be involved, and the substitution of vertical curves for the intersections of planes at changes of grade.

These improvements, together with others of a minor character, will also be considered in reference to extension for double tracking, in all of which steam shovel work and other methods will be dealt with in regard to their most economical and systematic workings.

The elevating or depressing of tracks in large cities in order to abolish grade crossings will be considered, in reference to the best methods to minimize cost and to give the least interference to traffic during the progress of the work.

Tunnels; Ventilation and Maintenance.—It will not be the province of the committee to enter into the question of the necessity for tunnels in certain locations, nor the simplification of the problem of ventilation by the substitution of other motive power for ordinary coal-burning locomotives at present in use; but rather to deal with the principles of ventilation as applicable to tunnels of various lengths, sections, and features of location, with present class of locomotives.

Mr. D. Bontecou, Chief Engineer of the Kansas City, Fort Scott & Memphis, suggested that the question of momentum grades could properly be included in the work of the committee, and Mr. H. G. Kelley, Minneapolis & St. Louis, suggested sliding and unstable banks; cases had recently come under his observation where the trouble was caused by defective original construction. The President of the Association, Mr. J. F. Wallace, Illinois Central, said that in some cases embankments built on that road 50 years ago have commenced to slip, and the most reasonable theory to account for it is that the increased speed and weight of trains have caused a disintegration of the mass. Another topic suggested was the effect of short choppy grades as a cause for train break-in-twos.

Buildings.

This committee consists of W. G. Berg, Chief Engineer, Lehigh Valley; H. W. Parkhurst, Engineer of Bridges and Buildings, Illinois Central; P. D. Ford, Chief Engineer, Long Island RR.; E. C. Macey, Chief Engineer, Iowa Central; C. E. Bryan, Superintendent of Maintenance of Way, Ohio River RR.; C. Millard, Superintendent, Chicago, Peoria & St. Louis; B. C. Gowan, Chief Engineer, Wisconsin & Michigan; M. W. Cooley, Engineer Maintenance of Way, Toledo & Ohio Central; A. S. Markley, Superintendent of Bridges and Buildings, Chicago & Eastern Illinois; C. T. Norton, Superintendent of Road Department, Mexican International; H. Pierce, Engineer Maintenance of Way, Chesapeake & Ohio; I. F. White, Superintendent Track and Structures, Cincinnati, Hamilton & Dayton; G. W. Vaughan, Supervisor of Bridges and Buildings, New York Central & Hudson River, and J. D. Isaacs, Second Assistant Engineer Maintenance of Way, Southern Pacific.

This committee proposes to divide the subject, assigning certain topics to individual members of the committee, who will collect information for next year's report.

During the discussion it was suggested that the committee in considering shop buildings, give attention to slow-burning construction, such as now used for mills. Also, that the particular department which uses the several kinds of buildings be consulted before typical plans are prepared.

Masonry.

This committee consists of W. L. Breckenridge, Chief Engineer, Chicago, Burlington & Quincy; E. P. Dawley, Division Engineer, New York, New Haven & Hartford; William Hood, Chief Engineer, Southern Pacific; H. G. Kelley, Chief Engineer, Minneapolis & St. Louis; W. E. Hoyt, Chief Engineer, Buffalo, Rochester & Pittsburgh; F. S. Stevens, Division Engineer, Philadelphia & Reading; C. F. W. Felt, Chief Engineer, Gulf, Colorado & Santa Fe; B. T. Randall, City Engineer, Baltimore, Md.; F. M. Bisbee, Superintendent Tracks, Bridges and Buildings, St. Louis & San Francisco.

The report was an outline of the proposed work, which is to be subdivided as follows: Under masonry will be considered the different materials used, namely, stone, concrete and brick. Next will come the design and construction of bridge masonry and arches; then culverts and small waterways made of masonry, iron or wood.

Mr. J. F. Wallace, Illinois Central, stated that the committee should define what is meant by "masonry," as in several instances litigation has hinged on the definition of this term. Also, that the ultimate economy of masonry and temporary structures should be considered. Mr. S. P. Hutchinson, Pennsylvania R.R., suggested that the proper shape of the opening of arches and culverts be taken up by the committee; that after deciding on an opening of given area there still remained the question of its form. In this connection, Mr. P. A. Peterson, Canadian Pacific, said that road now used flat segmental arches only, and not circular arches; it was also their practice to imbed large stones in concrete work. The Southern Pacific, also, has been using large stones in concrete for a number of years, and if sound stones are used good results are obtained, the work being cheaper than where crushed stone or gravel alone is used. Mr. W. E. Dauchy, Chicago, Rock Island & Pacific, was of the opinion that the committee could profitably make experiments to determine just how the strength of concrete is affected by using large stones.

Water Service.

This committee consists of W. E. Dauchy, Chief Engineer, Chicago, Rock Island & Pacific; D. Willard, Assistant General Manager, Baltimore & Ohio; H. C. Draper, Chief Engineer, Chicago & Alton; O. D. Richards, Chief Engineer, Ann Arbor Ry.; W. B. Story, Jr., Engineer and General Superintendent, S. F. & S. J. V.; G. H. Webster, Engineer Maintenance of Way, M. & N. W.; Samuel Rockwell, Engineer, Lake Shore & Michigan Southern.

It is proposed to subdivide this subject as follows: Source of supply; method of pumping and supply; character of water. The first topic will treat principally of the sources of water supply in the arid regions of the West and Southwest, and the location and boring of deep and open wells. Under the second topic will come the location of water stations, having regard for convenience, economy, safety of trains and their least delay. The methods of pumping by windmills and gasoline engines will be given special attention. The third topic will be made to cover a study of the additional cost of locomotive repairs on account of bad water, and the efficiency and cost of different water treatments.

Prof. Pence, of Purdue University, asked that the question of water tank construction receive attention in view of the fact that tanks have lately been made of steel. Mr. Dauchy said that on the Rock Island a number of steel water tanks had been built, and up to the raise in the price of steel they were very economical; and possibly it is even economical to build steel tanks under existing prices. With the metal construction, a large tank can be built so that all the pumping can be done in the day time, or in other ways enabling a reduction to be made in the labor charges. It was also suggested that the use of hydraulic rams be considered by the committee.

Signaling and Interlocking Plants.

The committee consists of H. D. Miles, Signal Engineer, Michigan Central; F. W. Scarborough, Engineer Bridges and Signals, Chesapeake & Ohio; W. J. Gillingham, Jr., Signal Engineer, Illinois Central; J. F. Hobson, Signal Engineer, Atchison, Topeka & Santa Fe; A. H. Sanford, Engineer, Pennsylvania Lines.

It is proposed to report on but one division of the subject each year, commencing with interlocking plants. These divisions are: Train order signals; distant signals; block signals, manually operated, and controlled by telegraph; block signals, manually operated and electrically controlled; automatic block signals; interlocking plants; highway crossing signals; miscellaneous questions, such as flag station signals, fixed signals for protecting trains at isolated points, signals connected with isolated switches, and colors for night signals. It is proposed to standardize, as far as possible, the specifications regarding the construction of mechanical interlocking plants, and the designs of material which enter into the construction of such plants. It is also proposed to standardize, as far as possible, the specifications regarding the design of block and train order signals, and the specifications covering the installation of automatic block signals. The requirements necessary in the matter of circuit designs, which are employed in automatic block signaling in order to insure safe operation, will be fully considered, as will also the question of proper indications to be given of the position of interlocked switches and signals which are operated in connection with power plants.

Mr. Dwight Morgan, Jr., Illinois Central, said that a profitable study could be made of the capital invested in interlocking plants at railroad crossings. When the first cost and short life is considered, and the maintenance charges capitalized, in many cases it will be found economical to separate the grades of the two roads rather than build interlocking plants.

Ties.

This committee consists of J. Kruttschnitt, Vice-President and General Manager, Southern Pacific; G. W. Kittredge, Chief Engineer, Cleveland, Cincinnati, Chicago & St. Louis; J. J. Frey, General Manager, Atchison, Topeka & Santa Fe; J. C. O'Melveny, Chief Engineer, Oregon Short Line; W. L. Darling, Assistant Chief Engineer, Northern Pacific; A. P. Herbert, Engineer and Superintendent, Mexican National Construction Co.; O. Chanute, Consulting Engineer, Chicago; William Archer, Division Engineer, Baltimore & Ohio Southwestern; W. C. Cushing, Engineer Maintenance of Way, Pennsylvania Lines West of Pittsburgh.

This report set forth the views of Mr. Kruttschnitt, which were endorsed by the other members of the committee. The following are extracts:

I think the subject of ties can be best studied from carefully kept statistics. In all publications relating to either the preservation or use of ties, one is struck by the absence of accurate statistical data. From past experience I should say that, in looking after the interests confided to them, railroad engineers and maintenance of way officers derive the greatest assistance from constant and close consideration of results attained on the lines of their neighbors and connections, as shown in statistics of operation. I would, therefore, most urgently recommend that blank forms be printed by the Association and sent out to all members, with a request that at least some of the data called for be furnished if it be found impracticable to furnish all, believing that, after the first few years, the value of this information will be so patent and highly appreciated that little or no difficulty will be met with in procuring everything desired. Objections on the score of expense are perhaps to be expected, but it can be asserted with confidence, based on experience, that the amount of work necessary to fill these blanks from year to year is insignificant, indeed, incredibly so to anyone who has not tried it. As in all undertakings, the beginning will be the most difficult to accomplish, but, once having started, maintenance of way officers and engineers will find that the data can be added from year to year with the expenditure of very little time or money.

Together with this statistical statement, I would suggest the rendition of other annual statements in the nature of progress reports showing what is being done in the way of preserving ties, what results have already been obtained from the various methods, and what has been determined to be the average life of ties of various kinds of wood.

Some of the subjects to be handled by the Tie Committee can be pretty well exhausted with one thorough

investigation, while others are of lasting interest, and, to be properly understood, should be studied over long periods of time, therefore requiring progress reports annually. In the first category we might place inspection, disposition of old ties, methods and general questions, while in the second category we might place the subjects of material, preservation and cost.

Mr. Octave Chanute said that in Europe all cross ties are treated, while in this country, in recent years, the treated ties have been about 1 per cent. of all used; this year it is estimated that 2½ or 3 per cent. of all the ties will be treated in one way and another. A tie famine is surely coming, which can only be averted by the adoption of methods which will prolong the life of ties, and through attention to timber culture. The metal tie is not looked upon with favor in Europe, and there is a reaction from its use. These ties are not sufficiently heavy, they quickly become rusted and distorted, and when in that condition they cannot be repaired. In France and Germany, creosoted ties are now mostly laid, and in France is to be found the highest development of the art of tie preserving. There the life of treated ties is from 20 to 25 years in main line, when they can be used an additional seven or eight years in sidings. In England, 12 to 15 years is the service obtained, and in Germany, 17 and 18 years is the life of treated pine and beech timber. The life, however, depends upon the thoroughness of treatment. Another feature of European practice is the use of lag screws in place of spikes, which could well be followed in this country; practically no spikes are used in Europe. The lag screws hold the rails to the ties, prevent slipping and cutting, and the collection of moisture around the spike holes.

In Europe, timber culture is under the control of the State, and private railroads are restricted in the cutting of timber. In Germany and France, 20 per cent. of the forests are controlled by the State, and the cutting of forests by private owners is rigidly regulated.

Mr. J. F. Wallace, Illinois Central, stated that another objection to the metal cross tie was its interference with electric track circuits, making it necessary to insulate the rails from each tie. Mr. G. W. Kittredge, Cleveland, Cincinnati, Chicago & St. Louis, said that laws had recently been passed in Indiana greatly reducing the taxes on lands planted and entered as forests, and certain lands not used by the road had been planted with catalpa trees. On one tract of 30 acres, 50,000 catalpa trees had been planted by contract, the terms being that, in addition to furnishing and planting the trees, they would be cared for during a period of two years; for all of which the cost was one cent per tree. Mr. Bontecou, Kansas City, Fort Scott & Memphis, spoke of the rapid growth of the trees and the long life of catalpa cross ties and fence posts. Mr. Kittredge said that in six years these trees were expected to be large enough for fence posts, and in 16 years to be fit for ties. The best conditions were a moist soil and climate. In some cases, however, after 20 years catalpa trees have become barely large enough for fence posts. Mr. Barnard, Pennsylvania Lines, said that a large number of catalpa trees planted along the right of way of that road after 12 years were not over 2 in. in diameter.

Ballast.

This committee consists of R. Montfort, Chief Engineer, Louisville & Nashville; W. H. Peddle, General Superintendent Maintenance, Southern; A. Mordecai, Assistant Chief Engineer, Erie RR.; J. R. Leightey, Roadmaster, Chicago & Northwestern; Edward Shelah, General Roadmaster, Wabash RR.; J. T. Richards, Engineer Maintenance of Way, Pennsylvania RR.; H. U. Wallace, Assistant Superintendent, Illinois Central.

The outline for future work is as follows:

Material—(a) Stone, size, quality; (b) gravel, cementing, loose, sandy; (c) burnt clay, quality, method of burning, etc.; (d) slag, cinder and burnt shale; (e) chatts, character; (f) earth; (g) dust prevention.

Standard cross-sections (variations, modified by material and other conditions).

Cost—(a) Material alone; (b) loading; (c) transportation; (d) unloading; (e) placing under track, surfacing and dressing.

Methods—(a) Handling material; (b) keeping trace of cost and accounts.

What constitutes ballasted track.

During the discussion Mr. J. F. Wallace, Illinois Central, referred to the claims made for the oil sprinkled roadbed, that dust was prevented from flying. But in riding over these roads he had noticed that all parts of the car were covered with a coating of oil and grit, of which passengers would probably complain. The cost was thought to be prohibitory for long roads, and as expensive as rock ballast. These statements were verified by Mr. S. P. Hutchinson and Mr. S. L. Shober, of the Pennsylvania RR., who gave the cost for a single application of crude petroleum oil at about $60 per mile, and two applications a year are required. Where the roadbed has been sprinkled, passengers have complained so much of clothes being ruined by the greasy deposit in the cars that the practice of using oil on the roadbed, especially between Philadelphia and Atlantic City, has been abandoned, and rock ballast is being put down.

Mr. W. C. Cushing, Pennsylvania Lines, said he was now experimenting with screened gravel, the cost being intermediate between rock ballast and good gravel. The sand from the screening plant is used for other purposes. On his Division, the gravel contains about 70 per cent. sand, and when screened costs from 20 to 25 cents a cubic yard. It is the intention ultimately to use rock ballast. At the present time 2-in. broken limestone is used somewhat, but if trap rock ballast, or something harder than limestone, can be obtained, sizes as small as 1 in. or 1½ in. are preferred.

The use of burned clay ballast was discussed at length, and it was shown that ballast of this kind, when first put into the track, was very dusty, on account of the presence of ash; after a few rains it becomes clean and remains in that condition. To obtain good results the ballast must be burned hard. One speaker, who had had considerable experience, stated that from three to five yards of ballast can be burned with one ton of slack, and although, in time, it becomes finely broken up, it does not wear out. Track so ballasted has never been known to heave in winter. On account of its light weight the ideal place to use it is over worn out rock ballast. The quality of burned ballast is impaired by the presence of sand in the "gumbo" from which it is made.

There was much difference of opinion as to the value of slag ballast. Mr. Churchill, Norfolk & Western, held that it was largely a matter of selecting the slag, as to results obtained. He has had good results with glassy slag, but this cannot be got from all furnaces.

Rails.

This committee consists of R. W. Trimble, Principal Assistant Engineer, Pennsylvania Lines; S. M. Felton, President, Chicago & Alton; A. W. Johnston, General Superintendent, New York, Chicago & St. Louis; Thomas Purcell, Division Superintendent, Mexican National RR.; C. A. Carpenter, Lake Shore & Michigan Southern; C. E. Wickham, Division Engineer, Chicago, Rock Island & Pacific; R. W. Hunt, Consulting Engineer, Chicago; J. H. Wallace, Assistant Engineer Maintenance of Way, Southern Pacific; G. B. Woodworth, Rail Inspector, Chicago, Milwaukee & St. Paul.

Extracts from the report are given in another place. In the discussion, Mr. R. W. Hunt was called on to explain why rails are not so good as formerly. This, in his opinion, is accounted for by the present method of hastening the process of rolling, so that the rails are finished at a high temperature. The question of chemical composition is held to be secondary to that of the physical treatment. Several advocated the making of specifications which, by united action of the members, could be forced on the rail makers. Mr. Hunt pointed out that it was bad practice to make frogs of second quality rails, as it amounts to putting inferior rails where the service is hardest. Mr. W. C. Cushing, Pennsylvania Lines, said a small quantity of nickel steel rails had been in service on the Cleveland and Pittsburgh Division on a 5 deg. curve, and no wear was appreciable after two years' service; it was too early, however, to reach conclusions.

Mr. Hunt stated that in the rail mill of the Tennessee Coal & Iron Company, the usual Bessemer converters were to be replaced by the Talbot process of making basic open-hearth steel. This process is almost continuous, and makes it possible to better get rid of the phosphorus, in turn enabling a higher percentage of carbon to be safely used; possibly as high as 1 per cent. The change will probably result in marked improvements, and in many places the abandonment of the Bessemer process, as most of the ores are non-Bessemer. Mr. A. Torry, Michigan Central, described his experiments with long rails.

Uniform Rules, Organization, Etc.

This committee consists of D. D. Carothers, Engineer Maintenance of Way, Baltimore & Ohio Southwestern; W. J. Wilgus, Chief Engineer, New York Central & Hudson River; E. H. Fitzhugh, General Manager, Central Vermont RR.; S. A. Quinlan, Vice-President and General Manager, Houston & Texas Central; James Oborne, General Superintendent, Canadian Pacific; T. F. Whittlesey, General Superintendent, Toledo & Ohio Central; C. S. Churchill, Engineer Maintenance of Way, Norfolk & Western; J. T. Mahl, Engineer Maintenance of Way, Southern Pacific, and F. B. Harrison, Superintendent, Illinois Central.

The report was a paper by the chairman with which a number of the committee disagreed.

Track.

This committee consists of E. A. Handy, Chief Engineer, Lake Shore & Michigan Southern; H. F. Baldwin, Engineer Maintenance of Way, Erie RR.; S. B. Fisher, Chief Engineer, Missouri, Kansas & Texas; W. W. Gwathmey, Jr., Chief Engineer, Sea Board Air Line; A. S. Chever, Chief Engineer, Fitchburgh RR.; B. Burwell, Jr., Chief Engineer, Florida Central & Peninsular; J. B. Moll, General Road Master, Chicago, Milwaukee & St. Paul; J. B. Robinson, Resident Engineer, Southern Pacific, and H. C. Landon, Engineer Maintenance of Way, Buffalo & Susquehanna.

This report was a brief discussion of some of the essentials of good track as prepared by the chairman. The principal point brought out in the discussion was that it is bad practice to reduce the number of ties used with heavy rails as one speaker proposed. The aim should rather be in placing heavy rail to put the ties as close together as tamping will permit. Mr. W. C. Cushing suggested that there were important questions relating to wheel and track gages not satisfactorily settled. With the present M. C. B. standard wheel gage the flanges of both wheels scrape the guard rails. Also the effect on track of flanging all the drivers of locomotives might well be investigated.

Bridges and Trestles.

This committee consists of Onward Bates, Engineer and Superintendent of Bridges, Chicago, Milwaukee & St. Paul; W. A. McGonagle, Superintendent of Bridges and Buildings, Duluth & Iron Range; A. Ziesing, Chicago; I. O. Walker, Division Engineer, Nashville, Chattanooga & St. Louis; E. Barrington, Prin. Asst. Engineer, Vera Cruz & Pacific; R. Modjeski, Chicago; D. W. Lum, Superintendent of Tracks, Bridges and Buildings, Southern Ry.; B. Douglass, Bridge Engineer, Michigan Central, and W. Michel, Engineer Maintenance of Way, Hocking Valley.

It is the intention to limit the next report to the subject of bridges and trestles in iron, steel and wood, and plans and specifications are needed from the railroads for I-beam spans, plate girder spans, lattice spans and pin-connected spans; including the methods of calculation, units employed, methods of inspection, erection and maintenance. Later, it is proposed to formulate specifications for typical structures of different kinds and it is thought two or three years will be needed to carry out the work fully.

Mr. J. F. Wallace thought one of the questions which this committee could study was how far the load on bridges can be increased above the loading for which they are designed. The actual limit should be established, and the unit stress determined which, if exceeded, will actually warrant strengthening or removing the bridge.

Records, Accounts and Reports.

This committee consists of H. F. White, Chief Engineer, Burlington, Cedar Rapids & Northern; Joseph Morrison, Resident Engineer, Central Vermont; L. F. Goodale, Chief Engineer, Hannibal & St. Joseph; J. T. Frazier, Baltimore & Ohio; D. McPherson, Division Engineer, Canadian Pacific; Henry Rohwer, Assistant Engineer, Missouri Pacific, and George Houliston, Division Engineer, Western, New York & Pennsylvania.

The reports simply outlined the nature of the work to be done before the next meeting and there was no discussion.

Election of Officers.

The election of officers for the ensuing year resulted as follows:

President—J. F. Wallace, Illinois Central.

First Vice-President—P. A. Peterson, Canadian Pacific. To serve two years.

Secretary—L. C. Fritch, Baltimore & Ohio Southwestern.

Treasurer—W. S. Dawley, Chicago & Eastern Illinois.

Directors for one year—W. K. McFarlin, Delaware, Lackawanna & Western and H. McDonald, Nashville, Chattanooga & St. Louis.

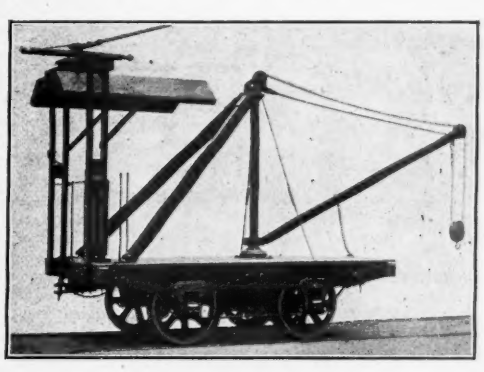
Directors for two years—D. J. Whittemore, Chicago, Milwaukee & St. Paul, and F. H. McGuigan, Grand Trunk.

Directors for three years—A. Torrey, Michigan Central, and Thomas Rodd, Pennsylvania Lines West of Pittsburgh.

All the committees are standing and are appointed to serve for an indefinite period.

A Combined Electric Crane and Motor Car.

The J. G. Brill Co. recently built a combined crane and car, both worked by electricity, an engraving from a photograph of which is shown herewith. Its service in and about the works of the company at Philadelphia has been very satisfactory. This combination has the advantages of an overhead hoist and an electric car for hauling castings, etc., although the one built is hardly adapted for general trucking. The crane alone can be used if desired,



The Brill Combined Electric Crane and Motor Car.

the required amount of counterbalance being obtained by putting ballast on the platform or in the pockets, which are between the sills of the car. It has a 5-ft. wheel base with a 3½-ft. overhang at each end.

The crane has a hollow mast made of 4-in. wrought iron pipe and the rope passes through this mast to the winding drum beneath the flooring. The jib is of iron and supported by a rod, as shown. The trolley stand is put at one end of the car near the controller and hand brake.

In the design shown the jib can be swung through about 180 degrees. Single trucks are used under the car built, but if it is desired to carry much freight or to do very heavy service, double trucks with heavy motors must be used, and the amount of ballast increased. The company states that three or four men with one of these combined cranes and cars should be able to do the work usually required by a gang of 15 or 20 common laborers.

The Railway Signaling Club.

The regular meeting of this club was held at the Great Northern Hotel, Chicago, on March 13. President Keppel was absent and the chair was occupied by Mr. C. S. Rhoads (C. C. C. & St. L.). Four active members and one honorary were elected.

Mr. Rhoads, from the committee on the question, What should be the safe working conditions for an interlocking plant? reported that inquiries had been made and answers received from 10 roads. The committee had not made up a formal report, but Mr. Rhoads summarized the views expressed in the 10 responses received, there being but little difference of opinion in essential points. Among the requirements named we note that in foundations iron or cement is to be preferred; lock plungers (with ends not tapered) should be adjusted so that the switch rail cannot be more than $\frac{3}{16}$ in. loose; detector bars should stand ¼ in. below top of rail and rise at least ¾ in. above top of rail; where trains pass interlockings at high speed electric locking should be employed to guard against throwing of levers while trains are on the switches. There was no discus-

sion on this subject, but the facts will be printed in the Proceedings with a view to having discussion at the next meeting.

The next topic was maintenance and inspection of automatic signals, the paper on which, by Mr. Balliet, was printed in the Railroad Gazette last week. Mr. Elliott criticised the author's view that a signal circuit should extend the whole length of a block section so as to be connected to every switch, believing this to be unnecessarily expensive, as well as increasing the liability to interference from lightning. Mr. Elliott is experimenting with track crcuit batteries whch are cleaned only once a month. Every other month he simply pours out a part of the zinc solution. Mr. Elliott thought that $52 a year, reported by Mr. Balliet, was a very low figure for cost of maintenance. Around Chicago the cost rises to from $75 to $85 per year per signal. He did not think his telegraph department would take his old zincs.

Mr. Poor (I. C.): For seven years we have renewed our batteries once every two months, throwing away all the old solution; we do not patch zincs at all. Mr. Poor has 128 distant signals with track circuit locks at each and has had no failure of the track battery for a long time. Mr. Poor, replying to an inquiry, says that he uses no lightning arresters at all; never had a failure from lightning.

Mr. Rhoads: On lines of poles where there are a considerable number of wires there is little or no trouble from lightning. Our troubles all occur on lines where there are not more than two wires.

Mr. Pflasterer's paper was next read, by the Secretary, and the reading was followed by a discussion of a number of questions concerning interlocking. Mr. Poor reported that pipe connections had in one case on his road been taken out because the machine, being old, had much lost motion.

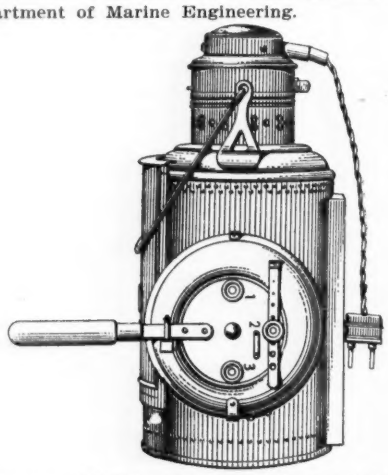
Mr. Rhoads: We have a number of Ratchford's compensators in use which give good satisfaction. This device has worked perfectly all winter without adjustment. In one case the signal is 3,000 ft. from the cabin.

Mr. Wileman (L. S. & M. S.): We are putting in pipe connections for all our home signals. In the case of a distant signal which makes trouble we lay gas pipe underground and run the wire through that, which gives entirely satisfactory service. One connection of this kind has been in use two years.

Mr. Elliott stated that he had in use two distant signals which work automatically with the home. One is a semaphore and the other a disk. The signal is controlled by a separate lever in the interlocking frame .

Scripture's Color Tester at the Paris Exhibition.

The investigations and discoveries of Dr. E. W. Scripture, of Yale University, in the field of color-sense testing are already known to the readers of the Railroad Gazette. An abstract of a paper by him on the detection of color blindness was published in the Railroad Gazette of June 16 last, and in the issue of Dec. 29 we gave a report of his address given before the New York Railroad Club in November and the discussion on it. Dr. Scripture has lately revised the monograph which he wrote on color sense testing, and it is to be sent to the Paris Exposition in connection with the United States Government exhibit. A semaphore lantern fitted up with the apparatus for testing will be shown as one of the Government exhibits in two places, namely, in the Department of Liberal Arts, Class 15, and in the Department of Marine Engineering.

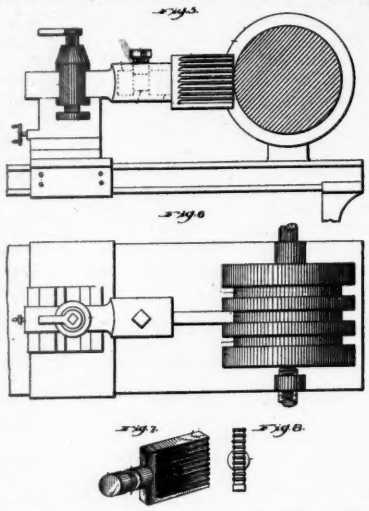


Lantern, with Color Disk, for Testing Eyesight.

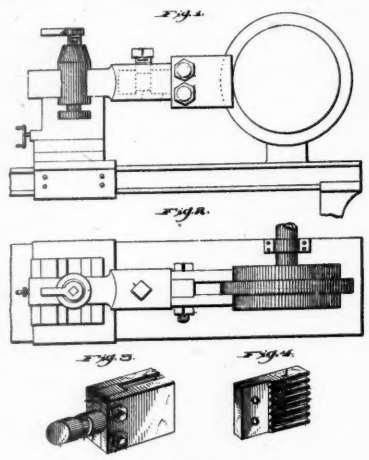
We give herewith an illustration of the lantern in its latest form as shown in Dr. Scripture's pamphlet. Behind the disk with three glass-covered openings, which appear in the cut, there is another disk with 12 openings containing 12 glasses of different colors, any one of which can be brought opposite either one of the three holes in the outer disk by turning the handle. The vertical slide, shown over the hole at the right side of the disk, is perforated with a series of holes of different sizes, the smallest only one millimeter (.04 in.) in diameter, for simulating a signal light at a distance. With a light of such small diameter the image on the eye of the subject fills only the center of the retina, and a test of this kind is necessary in some cases to detect a defect (in the center) caused by the excessive use of tobacco, for a large image would extend outside the affected area and enable the subject to conceal his color-blindness.

Tools for Finishing Piston Grooves and Rings.

The accompanying illustrations show two sets of tools for the machine shop, patents for which have been granted to Messrs. J. Pearce and G. H. Jackson, of Swissvale, Pa. The finishing tool, Figs. 1 to 4, is used for facing grooves in piston heads; and the other, Figs. 5 to 8, is a finishing tool for facing piston rings. The former was designed to accurately face the groove in the piston head to any desired width and depth to within 1/1,000 of an inch of the thickness of the piston ring, insuring a perfect fit of the ring in the groove. In using this tool, the grooves in the piston heads are cut in the usual way



Tool for Facing Grooves in Piston Heads.



Tool for Facing Piston Rings.

and to the desired depth, but are not made to the desired width of the groove. The tool, which is made up of a series of cutters (see Fig. 4), is fastened to the tool post in a position ready for use as shown in Figs. 1 and 2.

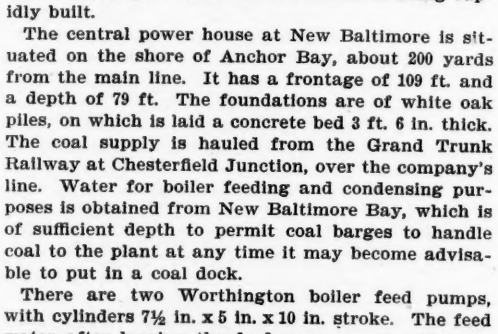
The tool for facing grooves in piston heads works on a similar principle. The tool finishes the groove both on the sides and at the botton. As in the one just described, this tool has a series of cutters, shown in Figs. 7 and 8.

New Combined Gasoline Engine and Air Compressor.

The Fairbanks, Morse & Co. have for some time built small air compressors in combination with their gasoline engines.* In the smaller sizes, the air cylinder is usually put tandem to the engine cylinder, but the two are on opposite sides of the crank axle. A number of these compressors are in daily use on railroads and by bridge builders for supplying air to pneumatic tools for riveting.

In the latest design for large compressors, a different arrangement of the cylinders has been adopted, as shown in the accompanying engraving. A massive double frame is bolted together by means of planed flanges, thus forming a complete base (of the usual design) for the engine and a smaller one supports the double-acting air cylinder of the compressor. This base is formed with a bored-out crosshead in which is guided the usual form of a Corliss cross-head. The engine crank is supported in three pillow block bearings, which are set at the proper angle to distribute the thrust of the engine in the base portion and not on the cap. Two fly wheels are used, as shown in the illustration. The side crank which works the air piston is close to the bearing, which is a part of the frame of the air compressor.

The intake and discharge valves are in separate cages, which can be removed from the cylinder head,



thus making it possible to easily clean these valves. The valves are seated and tapered, and made from one forging. The suction valves are made with a large stem, serving as a collar to prevent the valves lifting too far. The cage can be separated at the guide, thus allowing the valve (when formed as above) to be inserted. A specially designed unloading valve is fitted to the air cylinder, and arranged to throw the compressor out of action when the required air pressure has been raised in the receiver, thus relieving the engine of the greater part of its load.

The shaft governor of the engine controls the speed of the engine by cutting off the gasoline, admitting only a sufficient amount to keep the engine running. When the pressure falls in the receiver tank, the unloading valve automatically opens and again permits the compressor to supply the necessary amount of air, until the required pressure is again obtained.

* See Railroad Gazette. May 27, 1898, and March 3, 1899.

The Rapid Railway—Detroit to Port Huron.

One of the first of the high-speed inter-urban electric railroads in this country was built by the Rapid Railway Co. of Detroit, Mich. Originally, it extended in almost a direct line from Mt. Clemens to Detroit, a distance of about 20 miles, the cars entering the latter place on the tracks of the Detroit Citizens' Street Railway Co. Long double-truck cars were run at about 25 miles an hour up to the city limits of Detroit.

Important extensions have been built and the company will soon put in operation a line from Detroit to Port Huron, Mich., a distance of 73 miles. All the current will be distributed from a main station at New Baltimore, a point about midway between the two termini, with power distribution each way for a distance of nearly 40 miles. Cars will run every half hour from 7 a. m. to 11 p. m. between Detroit and Marine City, and hourly on the remainder of the line. The entire construction work is being carried out by Westinghouse, Church, Kerr & Company.

The new track from Mt. Clemens to Marine City is mostly on private right of way. It consists of cedar ties, laid on a foundation of gravel or stone ballast, and carrying a 70-lb. rail, with Washburn & Moen's crown bonds, and cross-bonded every 600 ft. The remaining 20 miles to Port Huron is being rapidly built.

The central power house at New Baltimore is situated on the shore of Anchor Bay, about 200 yards from the main line. It has a frontage of 109 ft. and a depth of 79 ft. The foundations are of white oak piles, on which is laid a concrete bed 3 ft. 6 in. thick. The coal supply is hauled from the Grand Trunk Railway at Chesterfield Junction, over the company's line. Water for boiler feeding and condensing purposes is obtained from New Baltimore Bay, which is of sufficient depth to permit coal barges to handle coal to the plant at any time it may become advisable to put in a coal dock.

There are two Worthington boiler feed pumps, with cylinders 7½ in. x 5 in. x 10 in. stroke. The feed water after leaving the feed pumps passes through a preliminary heater (made by the National Pipe Bending Company) which is put in the main vacuum to the condenser, where it will be heated to about 110 deg. F. The feed water will then pass through an auxiliary heater made by Baragawanath, of Chicago, and using the exhaust heat of the various auxiliary engines in the plant. These will heat the feed water to about 200 deg. F., delivering the feed to the fuel economizer at about as high a temperature as exhaust steam heaters will permit, giving a large supply of very hot feed water for periods of extra heavy loads.

The economizer is a Westinghouse, Church, Kerr & Company circulating type, built by the Green Fuel Economizer Company. There are four Babcock & Wilcox boilers, each of 300 h. p. nominal rating, and equipped with Roney mechanical stokers. The working steam pressure is 155 lbs. per square inch. Draft is produced by two heavy fans of the Westinghouse, Church, Kerr & Company's design. The stack is short, reaching only a few feet above the roof, and is 84 in. in diameter. Dampers are pro-

vided, so that either or both fans may be run at the same time.

The engine plant consists of three main engines and two exciter engines. The main engines are each of 1,000 h. p., built by the Westinghouse Machine Company. These engines are to run at 214 r. p. m. and have cylinders 21½ in. and 37 in. x 22 in. stroke of piston. The engines are direct connected to three 500 k. w. Westinghouse engine-type three-phase generators. The exciter equipments are each composed of a Westinghouse vertical single acting, single valve, compound engine, direct connected to a Westinghouse multi-polar 125-volt engine-type generator. Either is large enough to excite the three main generators and to supply current for lighting the power house.

All the engines in the main engine room are arranged to exhaust into one large Worthington condenser. Circulating water for this condenser is pumped from the intake well by an Edwards centrifugal pump, direct connected to a Westinghouse standard engine. This water before entering the condenser head, or cone, passes through a cooler, where it comes in contact with a set of brass tubes, through which the air from the cone passes on its way to the dry air pump.

A cleaning system, consisting of a Westinghouse standard air compressor and storage tank, with piping and nozzles for directing the air, is to be installed for cleaning the electrical machinery. A traveling crane of 40,000 lbs. capacity spans the entire engine room. The switchboard consists of two parts; one part is used for the control of the generator and feeder circuits, and the other for the control of the sub-station circuits.

The feed wires are carried from the back of the switchboard through the masonry floor of the engine room to the transformer room in the basement, which contains seven 400 k. w. Westinghouse transformers, arranged in two banks of three transformers each, one being held in reserve; one bank feeds the northern end of the line, and the other the southern end of the line. The secondaries are wound for 16,500 volts. The line and stations are protected by Wurt's non-arcing metal lightning arresters.

There are to be five sub-stations. Two will be south of New Baltimore, at the old power house site, and another at Mt. Clemens; one in the power house at New Baltimore and two north of New Baltimore, at Algonac and St. Clair. The sub-station at the New Baltimore power house is in the main engine room and has two 200 k. w. Westinghouse rotary converters, receiving three-phase current from the main bus, and supplying the trolley and low tension feeder lines with direct current.

The sub-station at St. Clair and at the old power house site are each equipped with three rotaries and six 150 k. w. Westinghouse step-down transformers, which lower the voltage from the high tension line voltage to a suitable voltage for use in the rotaries. The sub-stations at Algonac and Mt. Clemens each contain two 200 k. w. rotary converters, and three 150 k. w. Westinghouse step-down transformers.

The present rolling stock consists of 26 passenger cars, 42 ft. long, with 75 h. p. motors equipped with Westinghouse air brakes; also two combined passenger and baggage cars, and 14 railroad cars. The three high-tension transmission wires are carried at the top of the poles and the direct-current feeder cables are carried on cross arms below, a bracket construction being used to support the trolley wires from the same poles.

The various machines in the entire system will be operated in parallel, so that heavy loads on any part of the line will come on several sub-stations at once, tending to relieve the entire system.

Much of the district through which the line runs has heretofore been without railroad facilities, while the facilities offered by the new road may enable it to work up a business several times greater than now carried by the steam roads running between Detroit and Port Huron. Mileage books for 1,000 miles will be sold for $12.50. The schedule speed will be 27 miles an hour, including stops. Between stations, cars will run at about 45 miles an hour.

Arrangements are being made to use Baldwin-Westinghouse electric locomotives for the freight traffic of the road. The experience gained by operating the line from Detroit to Mt. Clemens shows that a good express and freight business can be developed. It is proposed to establish regular stations along the route for receiving and delivering freight and express matter; and in addition, a junction will be made with two or more steam railroads, from which cars can be hauled to stations on the electric railroad without breaking bulk or incurring transshipping charge. The company will also sell electricity for lighting and power to the cities, towns and residences along the route. The entire plant is expected to be in operation soon.

Proposed Novel Railroad Legislation in England.

The bill "for the better prevention of accidents to railway servants" just introduced into Parliament by the President of the British Board of Trade [which was briefly noted in the Railroad Gazette of March 9, page 156] is a new departure in road legislation; but it follows on the lines of existing laws in force in Great Britain for the prevention of accidents in mines and factories. In short, it proposes to bring certain sections of railroad employment within the legal category known as "dangerous trades," and to give to the Board of Trade powers to regulate these sections of railroad work, similar to the powers which another Government Department, the Home Office, already possesses in respect to mines and certain classes of factories.

The bill is the outcome of the recent inquiry by the Royal Commission into the causes of accidents to railroad servants, which itself was the outcome of the abortive "Automatic Couplers Bill" of last session. The result is that the couplers controversy has fallen temporarily into the background, the proposal now being to give the Board of Trade new powers of a general character, under which it would be able to frame and enforce rules for the prevention of accidents of all kinds and to "require the use or disuse of any plant or appliances," including, of course, couplers. The Royal Commission, which included in its membership the Chairman of the Midland Railway and the Deputy Chairman (and late General Manager) of the London & South Western, in its unanimous report made twelve "suggestions" of reforms immediately required:

1. Brake levers to be fixed on both sides of the wagons.
2. Similar labels showing the destination of the wagons to be placed on both sides of them.
3. Abolition of propping and tow-roping as far as possible.
4. That there shall be air or steam brakes on all engines.
5. That all stations or sidings where shunting operations are frequently carried on after dark shall be well and sufficiently lighted.
6. That where point-rods and signal-wires run across the ground in places where men engaged in shunting operations have to walk and work, such rods and wires shall be sufficiently covered over or protected. And that where points are worked by ground levers such levers shall fall parallel to the lines of rails.
7. That offices, cabins, etc., should as far as practicable be so arranged as to diminish the necessity for railway servants to walk upon the line.
8. That there shall be small marks provided to show "the fouling-points" for sidings.
9. That the gauge-glasses in the cabs of the locomotives shall be so constructed or protected as not when breaking to be a danger to the men.
10. That the arrangements for carrying tool-boxes, etc., and the placing of the water gauges shall be such that the men shall not have to pass over the back of the tender while the engine is running.
11. That the trains shall not be run upon running lines beyond the limits of stations or shunting sidings without a brake van being provided for the guard in charge to ride in.
12. That mechanical means or look-out men shall be employed to protect gangs of men when engaged in relaying the permanent way. That such means shall also be employed when necessary to protect men engaged in repairing the permanent way.

These twelve matters are accordingly embraced in the bill now introduced, as subjects with respect to which the Board of Trade may make and enforce rules immediately; whereas, with respect to other "operations of railway service" not specifically mentioned above, the Board is first to communicate with the railroad companies and give them a reasonable opportunity of reducing or removing the danger or risk, before making compulsory rules for this purpose.

With regard to automatic couplers the Royal Commission recommended thorough experiments as a precedent to compulsion, and accordingly the Board of Trade now proposes to take power to "make such experiments as they think expedient" with the assistance of the railroad companies. The Board further seeks power to inspect the working of any railroad at any time or place, such power being analogous to that possessed by the Home Office in respect of mines and factories.

As safeguards against an unjust use by the Board of Trade of the powers to be given it under the bill, it is proposed that the rules for railroad working shall be drawn up by a departmental committee, upon which the railroad companies shall have representation, and that the companies shall have the right of appeal, in cases of dispute, to the Railway and Canal Commission, a judicial tribunal which already adjudicates in disputes as to rates, terms of employment, workmen's trains, etc. It seems very probable that the bill will become law. C. H. G.

London, Feb. 24, 1900.

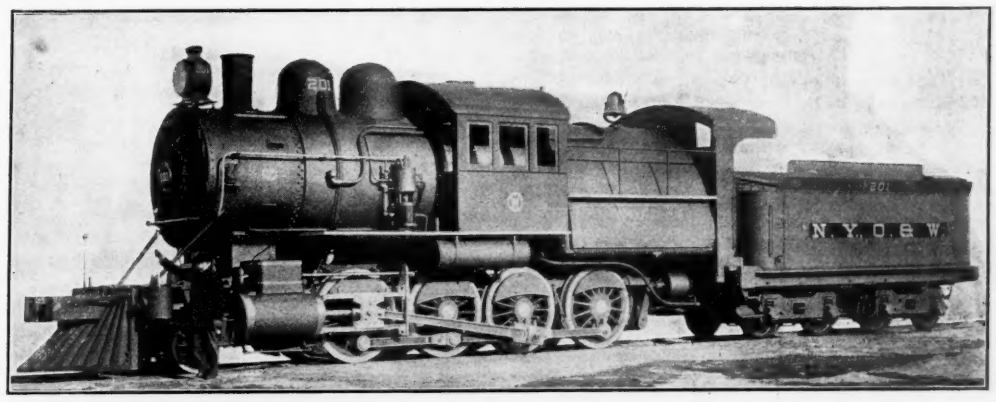
A Consolidation Locomotive for the New York, Ontario & Western.

Last month the Cooke Locomotive & Machine Co. shipped to the New York, Ontario & Western Railroad a 99-ton consolidation locomotive designed by Mr. George W. West, Superintendent of Motive Power of that road, to be used as a pusher on their heavy coal trains over the mountains. The engine weighs in working order 198,130 lbs., 170,200 lbs. of which is on the 55-in. drivers, and 20,930 lbs. on the trucks. The cylinders are 21 in. x 32 in. and the working steam pressure is 200 lbs. The boiler is a straight top type with wide elevated carbon steel firebox, having quadruple riveted horizontal seams. The heating surface of the tubes is 3,095 sq. ft., and of the firebox 194 sq. ft., making a total of 3,289 sq. ft. The grate surface is 87.4 sq. ft.

The tender weighs, loaded, 98,000 lbs. It has a tank capacity for water of 4,500 gallons and a coal capacity of 10 tons. The frame is made up of 10-in. steel channels, and the tender is equipped with Fox pressed steel trucks. The truck wheels are of chilled cast iron, 33 in. in diameter, and with an axle journal 5 in. x 9 in.

The following, from the condensed specifications, gives additional information about the locomotive here illustrated:

Driving wheel base	15 ft. 5 in.
Driving wheel centers, material	4 cast iron; 4 cast steel
Engine truck wheels	diameter, 30 in.; kind, Catasauqua steel tired
Driving axle journals, diameter	9 in.
" " " length	12 in.
Engine truck axle journals	diameter, 6 in.; length, 9 ½ in.
Boiler, diameter first course	78 in.
" thickness of shell	½ in.
" fire box	length, 119½ in.; width, 105 in.
" style of grate	Combined water tube and rocking bar
" tubes, number	362; diameter, 2¼ in.
" " length	14 ft. 9 in.
Slide valve, pattern	Richardson-Allen; travel, 5⅞ in.
Steam ports	width, 1⅝ in.; length, 18 in.
Exhaust ports	3¼ in. x 18 in.
Lap of valve	¼ in., inside lap; 1/32 in., outside lap
Exhaust pipe	High single nozzle, with petticoat pipe
Smoke box	Extended; smoke box netting, 2½ mesh
Center of boil from rail	9 ft. ⅛ in.; top of stack from rail, 15 ft. ¾ in.



Cooke Consolidation Locomotive for the New York, Ontario & Western.

Special Equipment.

Boiler shell steel	Carbon
Driving wheel tires	Latrobe
Injectors	Monitor
Steam gages	Ashcroft
Headlights	Star
Sanders	Houston
Boiler lagging	Franklin
Springs	Pickering
Couplers	Gould & Thurmond
Brakes	Westinghouse-American
Lubricators	Nathan triple
Safety valves	Coale
Whistles	Cooke L. & M. Co.
Journal bearings (driving axle)	Magnus
Piston packing	U. S. Metallic
Brake beams	Sterlingworth

Foreign Railroad Notes.

The Austrian railroads seem not to have had their share of the general prosperity in 1899. Though their gross receipts were nearly 2½ per cent. greater than in 1898, their earnings per mile were 2¼ per cent. less.

The Hungarian millers say that they are in a bad way and have called upon the Minister of Commerce to help them out by favorable railroad rates. But he found this not an easy thing to do. First he proposed a reduction in wheat rates to Budapest and to Fiume, the latter for exports. But the interior mills cried out that to reduce rates to Budapest would take away the wheat in their vicinity which they depend upon to keep busy. Then the Minister left the wheat rates alone and set about contriving a general reduction of flour rates.

At the close of 1899 the excavation of the Simplon Tunnel had penetrated 7,521 ft. at the north end and 4,120 ft. at the south end, which is about one-fifth of the whole length. The average daily progress in December was 19.4 ft. at the north end and 15.3 ft. at the south end. The number of employees engaged was 2,700.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856,
PUBLISHED EVERY FRIDAY,
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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to improvements. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The new railroad engineering association, namely, the American Railway Engineering and Maintenance of Way Association, held its first meeting in Chicago last week and started off in great shape. There was a large attendance of enthusiastic members, and the programmes laid out for the committees promise very important results. If the society accomplishes one-half of what it has started out to accomplish it will become one of the most important technical societies of the country.

The Mexican Government has decided to order the use on the railroads in that country of certain safety appliances. These include, to begin with and most important of all, freight car couplers of the Master Car Builders' vertical plane type. Besides that, grabirons, hand-holds, ladders, etc., for the protection of trainmen must be applied, and on passenger equipment either M. C. B. or Miller couplers and safety chains must be used. We understand that in the official circular issued by the Government, the couplers to be used were limited to two kinds, but we surmise that when the Government discovers that there are other M. C. B. couplers than the two specified, they will be admitted to the competition. We have not learned the date at which these changes must be made.

The most important and exciting railroad event of the week has been the change of ownership of the Third Avenue Railroad, the control of which has now been acquired by the Metropolitan Street Railway Company. No one can have been much surprised when the President of the Metropolitan announced that this had taken place. It was obvious enough that at some price the Metropolitan would gather in the Third Avenue; the only question was when that price would be reached. Indeed, for two or three years the logic of a consolidation has been apparent, and sooner or later it was bound to happen. We do not mean to suggest that we foresaw the bankrupting of the Third Avenue and the tremendous drop in the price of its stock which has taken place; but merely that we have considered the absorption of the Third Avenue by the Metropolitan as so probable as to be almost inevitable. Two such systems could not long live side by side in New York; that was contrary to good economics and to the public interest; but the men and the methods of the two systems long ago showed which of the two would survive. While Mr. Vreeland has repeatedly admitted this in conversation, he has also said that he could see no chance of consolidation under the then existing conditions. The controlling interests in the Third Avenue were not yet prepared to make terms that would make consolidation possible. Only the more or less rapid progress of events could bring about these necessary conditions. That progress was probably more rapid than anyone, even the best informed, expected, and to that extent some of the best informed have no doubt been surprised. The outcome must be regarded as fortunate. Mr. Vreeland says that the property is worth a great deal more worked in co-operation with the Metropolitan than in any other way. This we think nobody will doubt. He says that some millions of the proposed expenditure to put the Third Avenue on its feet can be saved by using the power plant of the Metropolitan, and we judge the great power house of the Third Avenue will never be built; or if built at all, will be built for some other purpose. Whether or not justice will ever be done to those who wrecked the property is doubtful. Some of them were foolish, some of them perhaps were nefarious, and perhaps some of them were both; but so far as the great public of the city of New York is concerned they have in spite of themselves done a good thing.

The New Maintenance of Way Association.

The first meeting of the American Railway Engineering and Maintenance of Way Association last week at Chicago was very successful, and in a large measure insures the future of that organization. While the papers, with a few exceptions, simply outlined the proposed work of different committees and did not in themselves furnish much basis for discussion, yet, in general, discussion was carried on with unusual vigor, and in no case did it lag. It is apparent that the membership is made up of men who not only are well informed but who can talk; and at times the ability to talk in meeting is almost as important as to have something worth saying. A large proportion are just such men as the dozen or so who in reality transact each year the important business of the Master Car Builders' and Master Mechanics' Associations, and between times run the railroad clubs that do useful work. That is to say, the average ability shown by the Maintenance of Way Association at the start is unequaled among railroad technical organizations; and, strangely enough, the railroad clubs have never been able to get these men interested in their meetings. In fact, the very reason for the new Association being started is that none of the present societies cover properly the field of railroad civil engineering.

The membership of the Maintenance of Way Association is already nearly 300, and considering that the Association was conceived about one year ago, it seems probable that this number will shortly be increased to 500; at the first meeting about 50 per cent. of the membership was present. This large attendance must partly be due to the novelty of the thing, and indeed it would be unusual if so large a proportion of the members can be depended on to attend the meetings. Last year the membership of the Master Mechanics' Association was 653, and about 24 per cent. of the membership was present at that meeting; corresponding figures for the Master Car Builders' Association are 458 and 37 per cent. It is along with these two bodies that the Maintenance of Way Association is to take rank. It may, however, be noted that the membership of the Association of Bridges and Buildings at the time of the last meeting was 164 and that 18 per cent. of the membership was present. Of a membership of 592 in the Roadmasters' Association, but 12 per cent. attended the last meeting.

The new Association takes a firm stand on all matters pertaining to entertainments, and all such things are controlled by the directors through a local committee consisting wholly of members. Exhibits also are not officially recognized, and as a result there were no exhibits at the Chicago meeting, although the representatives of a number of supply houses were present. Cutting off the entertainments by supply houses will doubtless keep away most of the men who go to conventions simply to have a good time.

The work as laid out is of wide scope, embracing the entire field of railroad civil engineering and maintenance of way, and the method of working is different from that of the railroad mechanical associations. It is proposed to have large standing committees on different subjects which will carry on investigations and report from year to year. This plan possibly has the advantage of keeping a large number of men on committees and in a way before the Association, but it is questionable whether these large committees with the individual members in different parts of the country can be got to work satisfactorily. Then with no stated time to report, the temptation is great to drag the work along from year to year, and in some associations it has almost become a function of standing committees to make excuses and briefly report progress. These objections are, of course, entirely removed where a committee really takes interest in a subject and works properly.

There is one thing especially which should tend to increase the importance of this new association, and that is the fact that many of the general officers of the railroads have come up through the civil engineering department, and a number of these general officers have from the start been identified with the new organization. Others who possibly may not join will be inclined to consider favorably such recommendations as may be made. Under the constitution all general officers interested in railroad operation are eligible to membership as well as the engineers in responsible charge of maintenance of way.

Annual Reports.

Canadian Pacific.—The annual report of the Canadian Pacific for the calendar and fiscal year to Dec. 31 last, like the preceding reports, shows a marked gain in earnings and in traffic. As a result, the directors were able to declare increased dividends on the common shares, which are now established on a six per cent. basis. In 1899 the payment authorized was five per cent., as against four per cent. in 1898; dividends on this issue having been resumed in 1896. The shareholders are now receiving a higher return than before 1895, when dividends were suspended, with the heavy decrease in earnings and the exhaustion of the Government funds available for such payments.

The increase in gross earnings in 1899 was $3,091,000, and in net, $1,755,000. As compared with the 1897 results, the enhancement in gross receipts is $5,189,500, and in net, $1,926,400, or 21 and 19 per cent. respectively. If we go back to 1895, the worst year of the depression, some remarkable comparisons in the earnings and traffic returns are obtained. Thus, gross receipts have gained no less than $10,477,000, with an expansion of only $4,671,000 in expenses, so that the gain in net runs up to $5,806,900, with practically no increase in the fixed charged as reported by the company. The surplus showing is a remarkable one, a balance of $6,564,000 being earned last year before dividends, whereas, in 1894, the interest charges were not earned by over $526,000. Comparing the income account of the last three years, the progress of the company as regards earnings may be readily seen. The figures follow:

	1899.	1898.	1897.
Passenger earnings	$ 7,098,097	$ 6,538,590	$ 5,796,115
Freight	18,738,885	16,231,445	15,257,897
Mail and misc	1,723,994	1,680,951	1,495,737
Total gross	$29,230,038	$26,138,977	$24,049,535
Oper. expen	16,999,873	15,663,606	13,745,759
Net earn	$12,230,165	$10,475,371	$10,303,776
Other income	1,150,199	423,367	340,706
Total income	$13,380,364	$10,898,738	$10,644,482
Charges	6,816,676	6,774,321	6,783,367
Balance	$6,563,688	$4,124,417	$3,861,115

The chief interest of the report is not so much in the exhibit of earnings as in its constant and considerable extension in mileage. It serves a country greater than is served by any other single line of railroad in the world. In mileage and in tonnage some very large increases are recorded. The Canadian Pacific now has over 9,800 miles of rail line, besides its extensive steamer and other interests. Since 1894 over 887 miles have been added to the company's lines, the expansion being equal to about 10 per cent. The expansion of the traffic movement in the same period has equaled nearly 70 per cent. as regards the actual tonnage moved and nearly doubled as regards the ton-miles. The growth of passenger traffic was over 26 per cent. in number, and over 50 per cent. in passenger-miles. The comparisons of the 1899 figures with those of 1894 are given below:

	1899.	1894.	Increase.
Tons moved	6,620,900	3,891,800	2,729,100
Tons one mile	2,539,171,900	1,313,948,100	1,225,223,800
Ft. train mile earn.	$1.66	$1.60	$.06
Pass. carried	3,818,857	3,009,015	809,842
Pass. one mile	397,411,700	260,804,100	136,607,600
Pass. train mile earn	$1.15	$1.01	$.04

This growth is far in excess of that which may be attributable to the larger mileage, the traffic figures of 1894 including 6,343 miles and those of 1899, 7,000 miles, an increase of 657 miles; the difference between these figures given above, representing the whole system, being accounted for by the controlled American lines and those operated under agreements with the owners. Obviously such a development of traffic is a matter of wider interest than is the progress of one line of railroad. It represents the development and upbuilding of an empire, which has been immeasurably helped by this one line of railroad, not only in perfecting the transportation efficiency of its main line, but in the extensions it has built into every new and promising section, as its development became at all important, the most recent instance being in the mining districts of Southern British Columbia. It would be of particular interest to trace the development of particular classes of traffic, but the company's reports are not in such form that much help can be obtained from them.

Taking a few of the larger items of tonnage transported, the following comparisons, bringing out the changes of five years, will be of interest:

	1899.	1894.	Increase.
Bbls. flour	4,005,200	2,439,400	1,565,800
Bu. grain	42,763,300	25,314,800	17,448,500
Head live stock	810,600	466,200	344,600
Ft. lumber	957,702,400	545,489,000	412,213,400
Tons manufac.....	1,795,700	968,400	827,300
Tons all other articles..	1,461,100	864,600	596,500

The extension of line and the improvement of facilities have called for large expenditures, obtained by the issue of new capital, as earnings could not furnish the funds on the enormous scale which has been demanded. How heavy these demands for new capital have been is illustrated by the fact that the capital improvements and new rolling stock last year called for over $13,000,000 of new capital. For the construction of branch lines, $2,143,000 was added to the capital investment; for improvements on the main line, $1,900,000 was capitalized and additional rolling stock called for $2,434,000. The needs of the year developed such heavy demands that the cost of the work carried out exceeded by over $1,070,000 the amount fixed early in the year and authorized by the shareholders. The directors detail improvements in the present report, whose estimated cost aggregates $3,265,000, and which they propose to carry out this year if the stockholders authorize the required issue of new capital. It is of interest to note that the company provides its capital funds by the issue of preferred or debenture stock. Its outstanding bonds do not increase, and, as has been pointed out above, the fixed charges are practically unchanged over a series of years, being only $227,000 higher in 1899 than in 1894. But if bonds are stationary the volume of outstanding capital shows heavy increases, as will be seen by the following table, giving the amounts of the various issues issued in 1899 and in 1894:

	1899.	1894.	Inc. or Dec.
Common stock ....$	65,000,000	$65,000,000	$.....
Pref. stock	26,791,000	6,424,000	Inc. 20,367,000
Debenture stock ..	54,237,083	41,279,675	Inc. 12,957,408
Mortgage bonds ..	47,238,086	48,088,086	Dec. 850,000
Land grant bonds.	18,259,500	18,426,000	Dec. 166,500

It may be noted that the Canadian Pacific carries its business at low rates, its ton-mile revenue being only 7.4 mills in 1899 and the passenger-mile rate 1.79c., the latter being a recovery from the abnormally low figure of 1898. The decrease, as compared with other years, is not material, the ton-mile rate in 1895 having been 8.0 mills and the passenger-mile rate 1.80c.

The announcement by the Southern Pacific Company that there would be established for the benefit of the employes a relief department, and that the company would pay $36,000 a year toward its support, seems to have aroused certain San Francisco newspapers to a display of sensational hostility against the road which is seldom surpassed even by themselves. A number of the papers of that city make it their business to defame the road on every possible occasion, especially when by a fake picture, filling half a page, they can, in giving the report of an ordinary minor train accident, make it appear that there has been a great disaster. Like newspapers of the same kind in the East and elsewhere, they employ reiteration and padding as their chief weapons, using some proportion of actual and bald untruth. In the present case the claim put forth is that old employes are to be coerced into joining the Relief Department and that thereby the men will be compelled to sacrifice memberships of long standing in their brotherhood relief associations. The Superintendents have reassured the employes, telling them that the voluntary feature of the new scheme is just what it purports to be; but that does not disturb the "journalists" in the least; it furnishes new fuel for their fire. We do not learn that the newspaper uproar has had any serious effect, and we do not know that it deserves as much notice as these lines will give it; but we mention the subject for the purpose of copying Vice-President Kruttschnitt's very clear explanation of the attitude of his company (and others) toward employes in the matter of damage claims. He says:

"It is not the policy of railroads [in general], and is not the policy of the Southern Pacific to litigate claims with its employes. When accidents happen the bulk of them may be placed in two categories. One where the company is liable; the other where it is not. Self-interest prompts the company to settle all cases out of court where it is liable, and in the majority of cases where it is not liable, some relief is given the employe. The balance of accidents can be placed in the category where the liability is not clear, and cases of this character are fought only when the demands made on the company are entirely unreasonable. They constitute a very small portion of the claims arising. In every case, however, when a settlement is made out of court a release from all further claim is exacted. In the case of the relief department the injured employe has a perfect right to sue if he so desires, and if he thinks he can obtain more that way than by accepting the relief tendered him peaceably and without litigation. As the company contributes materially to this relief it has a perfect right to ask for immunity from further claims thereafter. This clause, which has been so much discussed, is copied from the regulations of the relief departments of the Plant System, the Philadelphia & Reading, Baltimore & Ohio, Burlington, Pennsylvania Railroad and Pennsylvania Lines West of Pittsburgh, which cover between 125,000 and 140,000 employes, all of whom seem to be living contentedly and happy."

It seems to us that the only real grievance that a brotherhood insurance association could have would be the danger of future losses. If all new employes join the railroad company's association it is imaginable that after five or ten years the brotherhood might have difficulty in securing new members, and thus be forced to go out of business. But if the brotherhood associations are in good financial condition they must have reserve funds which should enable them to reinsure their members without loss in some other association. It appears from a statement in the Oakland Tribune that Mr. Kruttschnitt has offered to make just this arrangement. This would seem to remove all serious objection. It cannot be that the brotherhoods are dependent in any great degree for their prosperity on the employes of any single company, even a large company like the Southern Pacific, so that the cloud on their prospects cannot be a very black one at the worst. If a mutual insurance association has not a reasonable surplus the members might as well be made aware of the fact at one time as another. In such a case it may be to a man's interest to sacrifice what he has paid into such an association, and go into a stronger one.

NEW PUBLICATIONS.

Monopolies and Trusts. By Richard T. Ely, Professor of Political Economy in the University of Wisconsin. New York: The Macmillan Co.

Professor Ely announces this little volume as "a small part of a great work" on the general subject of "The Distribution of Wealth," on which he has been engaged for the past seven years. At a time when there is so much loose talk on the general subject of this volume, it is desirabel that a clear idea should be formed as to what a monopoly is. It will probably astonish most of those who have freely expressed opinions on the subject to learn that the economists themselves have the widest divergence of opinion on what constitutes a monopoly, some substantially including all business under that head—either an actually monopoly or in process of becoming such. Professor Ely's careful distinction between monopoly and concentration of production removes from the former class by far the larger part of the great consolidated industries which have been established of late years, and are popularly spoken of as "monopolies."

The tendency to concentration, to doing business on a large scale instead of a small one, is irresistible in many industries; but the extent and rapidity of it recently have been greatly exaggerated by consolidations whose purpose has been not to secure economy in production or even actual monopoly, but to take advantage of a popular delusion that almost any great concentration of industries may control the market and secure extraordinary profits. The promoters of these enterprises reap their harvest when they have sold the shares and bonds of their consolidated companies. "The so-called trusts," says Professor Ely, "are not a bad thing, unless business on a large scale is a bad thing. On the contrary, when they come about as the result of a free development, they are a good thing, and it is a bad thing to attempt to break them up; from efforts of this kind no good has yet come to the American people." This is said, be it remembered, after denying that the great concentrated businesses are necessarily monopolies, and affirming that those which exercise in any important degree monopolistic power, do so by the aid of other industries which are in their nature monopolies and as such require public control.

The Railways of England. By W. M. Acworth. Fifth edition. Large octavo, 480 pp., with 67 illustrations and index. London: John Murray, 1900.

Mr. Acworth published the first edition of this book in 1889. Since then he has published his "Railways of Scotland," "The Railways and the Traders," and many articles and letters in magazines and newspapers. He has lectured on railroad matters, has traveled and seen much and has become known in Great Britain, in the United States and in Europe as an acute student of railroads and as a catholic and analytical writer. Surely he needs no introduction to our readers.

This fifth edition of the "Railways of England" is mostly an exact reprint of the earlier editions. Mr. Acworth explains that he has not time to rewrite the book, that there is still a steady demand for it and that he is "reluctant to let it die." He has therefore written a preface and a supplementary chapter, and probably that was the best that he could have done, for really the English railroads have changed very little in the ten years.

Probably the reader will remember the scheme of the book. Mr. Acworth describes the eleven important railroads, telling something of the history and a good deal about the track and structures and equipment of each. He tells also of their ways of doing work; and he writes always with live interest in his topic and with excellent simplicity of statement. He succeeds not only in informing us, but in entertaining us. On the whole, his book has its own place in railroad literature and that place is important.

The supplementary chapter is given mostly to the changes that have taken place in passenger-train service and in passenger fares, and this is illuminated by Mr. Acworth's recent long journeys in the United States. He reproaches the railroad men of England for having permitted the Americans to pass them in some ways, to the loss of glory and of trade. But apparently he does not despair of his country for all that—and what Englishman could? The breed is still of the very finest in the world, and the conquering qualities are unabated.

Cement. Published every two months by the Progress Publishing Co., 13-21 Park Row, New York. Price 20 cents a copy or $1 a year.

The publishers of "Cement" think that they have discovered a field for a new trade journal. The cement industry has grown in this country to great importance while its literature is still scanty. It is said that the output of cement in 1899 in America was more than 5,000,000 barrels, while 10 years before it was less than 500,000 barrels. The publishers of this new journal therefore think that they have a field, and perhaps they have. In such matters we learned long ago not to prophesy. The first issue contains an article of 16 pages on the history of the cement industry and cement testing by W. S. Humbert. There are a few short articles giving specific application to buildings, breakwaters, etc., with some interesting illustrations.

Railway Control by Commissions. By Frank Hendrick, Ricardo Prize Fellow in Harvard University. 12mo, 161 pages. New York: G. P. Putnam's Sons, 1900. Price, $1.

Mr. Hendrick has prepared a useful little volume. Seven of the chapters are given up to railroad regulation in France, Italy, Austria, Belgium, Germany, England and the United States respectively. Another chapter treats of railroad regulation in Massachusetts as a guide to American Control, and still another of Switzerland and the State purchase of railroads. Obviously, it will be of a good deal of convenience to many persons who wish, for one reason or another, to look into the matter of governmental control to have a compact and handy summing up of the efforts of various States and countries.

Engineering Association of the South. Transactions for 1899. Published by the Association. Howard M. Jones, Secretary, 1000 Broad St., Nashville, Tenn.

This is a pamphlet of 102 pages containing 10 articles and addresses, also a list of the members of the Association. There is an article on preliminary surveys and location and one on railroad construction, both by Mr. W. H. Spradlin. There is an article on passenger stations on the line of the Nashville, Chattanooga & St. Louis by Mr. Herman Gaebler.

TRADE CATALOGUES.

Lucol Paints and Lucol Oil.—The American Lucol Company, 44 Broadway, New York City, issues a little pamphlet descriptive of the organization and work of that company and of its products. The company was organized more than 10 years ago, with a capital of $1,000,000, $500,000 of which was cash. The incorporators were those who had discovered from trials on a large scale the fact that paints mixed with Lucol oil wear better than those mixed with linseed oil. The business of the company was at first to make Lucol oil. Naturally, the question is frequently asked, What is Lucol oil? But the company considers that this question, or any attempt to answer it, would now be superfluous. The actual use of the oil is the best reply to any such question. In general terms, however, it may be said that this is a manufactured oil built up synthetically, and is not a mixture. It contains neither rosin, rosin oil, fish oil, benzine or anything else which could be injurious to paint or to the substance on which it is put. The company built a factory at Carteret, N. J., and has now a tank capacity for 500,000 gallons. Three years ago it began the manufacture of paint, and the paint department is being enlarged now for the second time by the addition of a thoroughly modern paint mill. The company makes paint for all purposes, making carbon, graphite, iron oxide, red lead and lead-zinc paints in all tints.

Pneumatic Tools.—The Philadelphia Pneumatic Tool Co., Stephen Girard Building, Philadelphia, Pa., has issued a set of bulletins descriptive of pneumatic hammers, rammers, drills and reamers made by the company. The company announces that it has made arrangements with the Kellar Tool Co. to market the entire output of that concern, consisting of hammers of all sizes for chipping, calking, beading flues and driving rivets; drills of both the rotary and piston types, in all sizes; yoke and hand riveters; air motor chain hoists; pneumatic sand rammers for foundry use; fluted reamers; flue rollers; flue cutters and all other appliances that go to make up a complete line of pneumatic machinery. A liberal policy

of sending tools on trial has been adopted, trials being limited to ten working days. A descriptive catalogue and price list will be sent to applicants.

A pamphlet recently issued by the W. Dewees Wood Co., of McKeesport, Pa., is sure to attract and hold the attention of all into whose hands it falls. The well-executed engravings alone give a pretty good notion of the process of making Wood's patent planished sheet iron; and with the aid of the text one can get considerable information about this product, which has during the past 30 years driven from the market nearly all the imported Russia sheet iron, because of its superiority in quality and finish, and its lower cost. The important steps are noted in making the finished product, beginning with the preparation of the charcoal and the selection of the iron. Tables for iron and steel plates and sheets are given in the last pages.

The Chicago Pneumatic Tool Company has issued a pamphlet given up entirely to testimonials. This pamphlet has 158 pages and it is not often that an enterprise so new can offer such a fine lot of endorsements.

The Ludowici Tile Roof.

The accompanying engravings show an interesting form of tile roof made by the Ludowici Roofing Tile Company, Chicago, which is now being used extensively for railroad shops, train sheds and stations. This roof consists of tiles which interlock and are laid without sheathing on a steel frame. The application to a roof of 64 ft. span is shown in Fig. 1.

It will be seen that the trusses are connected by nine purlins consisting of 10-in. steel channels, upon which, and between the trusses, are laid four lines of 4-in. channel rafters. On these rafters are placed longitudinal rows of 1⅜ x 1⅜ x 1¼-in. steel angles spaced 13⅜ in. center to center. The tiles are laid directly upon these angles and interlock on all sides so as to form water-tight joints. A cross-section through one of these tiles is shown in Fig. 2, while Figs. 3 and 4 show respectively the joints at the sides and ends. Every fourth tile is fastened to the roof framing by a copper wire which passes through a lug in the underside of the tile, and in conjunction with the interlocking of the tiles makes the roof secure.

Some of the advantages not possessed by other roofs are that the tiles are not affected by gases and vapors from locomotives. If a tile is broken it can be replaced exactly as before without disturbing the other tiles, and, where it is desired to admit light through the roof, glass tiles of the same form as the clay ones are substituted. This avoids breaking the roof with the usual frames for sky-lights. No cement is required to make a water-tight roof, but in exceptional cases the joints are pointed on the underside so as to exclude dust and fine snow.

The tiles are 9 x 16 in. and following the German practice they are not vitrified. This makes them slightly absorbent, sufficiently so to absorb any condensation and prevent the dripping of moisture from the roof. Tests have shown that as a non-conductor of heat the tiles are about equal to wood and better than glass. The tiles weigh from 750 to 800 lbs. per square and no heavier roof construction is needed than for ordinary slate; the cost per square is $6 at the factory.

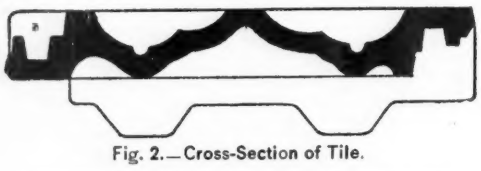

Fig. 2.—Cross-Section of Tile.

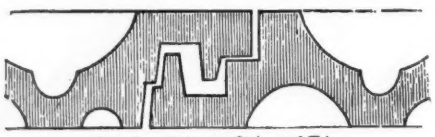

Fig. 3.—Joint at Sides of Tile.

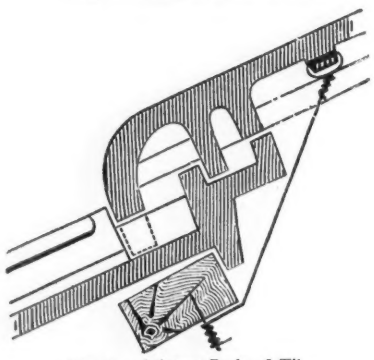

Fig. 4.—Joint at Ends of Tile.

This style of roof has been used for the new passenger station of the Burlington & Missouri River at Omaha, the Oelwein shops of the Chicago Great Western and for the train shed of the new station of the Peoria & Pekin Union at Peoria, besides for a number of smaller stations for various roads in the Central States. It has also been used largely for manufacturing plants, two notable instances being the new shops of the McCormick Harvesting Company of Chicago, where 1,000 squares are used, and the new works of the Dominion Steel Co., now being erected at Sidney, Cape Breton Island, where 3,000 squares will be used.

Rails.*

This Committee has received a communication from a member in Canada, unable to be present, asking and, we might very properly say, imploring the help of the Association toward securing better rail. His railroad is buying from the States; the rail is soft and wearing badly. The mills have been asked to give better rail and the reply is that the railroads in the States are using the same rail, and what is good enough for the States is good enough for Canada, and here endeth the first lesson. Your Committee is also of the same opinion as the mills "that rail good enough for the States is good enough for our brother in Canada." And this brings the issue squarely before us:—Is the rail now furnished by the mills of the States good enough for the railroads of the States? If this Committee could conscientiously answer yes, then it might congratulate itself on having an easy life ahead. We cannot, however, concede the truth of the statement, that the rail we are now getting is good enough, and we will therefore aim to make such practical suggestions or recommendations as shall help toward a solution of this vexatious problem.

It may not be out of place to call attention to the fact that many well meaning efforts at reform have been in vain on account of the very radical position taken by some of the persons connected therewith. Therefore, if any of us incline to extreme views in such matters as high carbon or low carbon, let us find at least some common ground on which we can take a stand and then we shall make headway, possibly slowly, but surely. If we agree on uniform sections for all our lines we will eventually save for our companies, and possibly, in addition, increase the profits of the rail manufacturers, about which so much talk has been heard in Pittsburgh recently. Let us agree on one other thing—that the mechanical treatment in rolling and the temperature at which the rail is finished is of the greatest importance—then insist on the mills making an improvement in this regard.

If this Association can agree on a specification for the manufacture of rail, which may not be perfect, but which will be a step in advance of what we are doing, have it approved by our companies, and accepted by the rail manufacturers, decided progress will have been accomplished. It would appear better that we should attain our goal by making two or three steps, if necessary, as we are able, rather than by trying a big jump and fail.

Sections.—The railroads of United Kingdom are almost universally using the bull-headed steel rail, keyed into chairs fastened to transverse sleepers, while in America we use flat-bottomed rails, resting direct on transverse sleepers. From a paper reported by William Hunt, Chief Engineer of the Lancashire & Yorkshire Railway, read before the International Railway Convention of 1895, we take the following:

The engineer of the Great Northern Railway of Ireland, comparing our American practice with the English, says, "as the steel rail (American) is immediately in contact with the sleepers, the result is a very smooth running road; at the same time there is no doubt that our steel bull-headed road, with the chairs keyed inside, is far superior, stronger, more permanent and better in every way than any flange railroad."

The Chief Engineer of the N. Y. C. & H. R., reporting on the American type to the same body, says: "Rails supported in 'chairs' have been out of date in this country for many years past, the Vignoles type, or 'flange' rail, as it is termed in this country, having proved immeasurably superior in service and economy on American railroads."

The Committee being of the opinion that the A. S. C. E. sections are a step in advance, is of the opinion that no new sections should be suggested until we have had full time to learn from experience the merits of these sections. It is recommended that all members of this Association whose lines are not using these sections be urged to have them adopted and used on their lines. The results should be carefully compared with results from the old sections. Mr. Manning writes us that "the A. S. C. E. sections are by far the best with the exception that the head should be a little deeper for rails under 90 pounds." Of course, you all know that Mr. Manning has a section of his own for curved track, which he thinks can be applied to straight line also with good results. The percentage of curved tracks on a majority of lines is small, so that in the opinion of a majority of the Committee, no additional sections are needed to meet the situation.

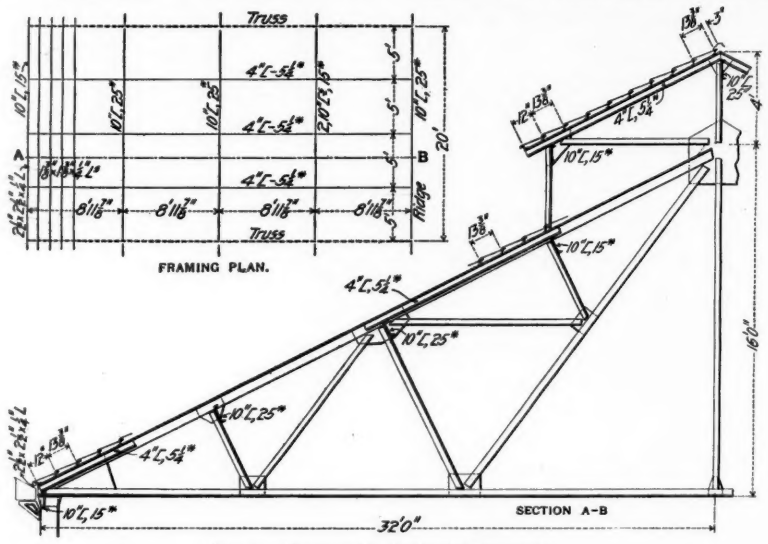

Fig. 1.—Framing for Ludowici Tile Roof.

Referring again to the A. S. C. E. sections, we must always bear in mind that the best result from these sections will not be obtained until better work is done at the mills, and this brings us to the chemical constituents and the mechanical treatment, the latter being probably the more important.

Chemical Constituents.—Experiments are being conducted on a small scale with open-hearth nickel-steel, Bessemer nickel-steel and high and low carbons. These special rails are very high-priced, and in the opinion of the Committee are not likely to come into general use at least for some time. We do not consider it advisable to treat this matter at length at this time any more than to call attention to the fact that in many cases of rails giving good service, we have to look beyond the chemical constituents, as we shall see later.

Your attention is called to an abstract from the Railroad Gazette of November 24, 1899, on hard and soft or high and low carbon rails, as follows:

"Quoting the results of experiments on the Netherlands state railroads, in which 16 German rails were made from four different charges, two of which contained 0.38 carbon and two 0.21 carbon. After 1,833 days' service these rails were reweighed and the loss of weight in the case of the soft rail was 28 per cent. more than in the case of the hard rail. After 3,787 days' service they were again reweighed and found that the hard rails had lost 14 per cent. more than the soft rails, with total results after 5,620 days and 91,459 train movements the soft rails had lost 4 per cent. more than the hard rails.

"In addition to this, 22 Belgium rails were laid, made from six different charges, three of which contained 0.45 carbon and three 0.25 carbon. After 2,040 days' service the soft rails had lost 29 per cent. more than the hard rails, but in the next weighing, after 3,635 days' service, the hard rails had lost 5 per cent. more than the soft, with a total result that, after 5,675 days' service and 98,938 train movements, the soft rails had lost 7 per cent. more than the hard.

"In the first reweighing the hard German rails lost, per meter and per 10,000 trains, 133 grammes, while on the second weighing they lost only 91 grammes per meter and per 10,000 trains. In the soft German rails these losses were respectively 170 and 80.

"With the Belgium rails at the first reweighing the hard rails lost 121 grammes per meter and 10,000 trains, while on the second reweighing they had lost 98 grammes. The soft rails had lost 156 grammes per meter and 10,000 trains in the first period and 93 grammes on the second period."

*Extracts from a committee report to the American Railway Engineering and Maintenance of Way Association.

Attention is called also to a paper by one of the members of this committee, Mr. Hunt, some years ago, in which he brought out the fact that rails with widely different chemical components gave equally good service.

Mechanical Treatment.—The rolling of the rail is of the highest importance; the best American rails appear to have been made about 1880; there was then no good uniformity in chemical constituents of Bessemer steel; it varied widely, but such variation had but little influence on the wear of the finished product. In order to determine why the rails gave good service, we must therefore look to the methods of manufacture, and the molecular structure of the steel resulting from these methods.

The following description of the old and new methods, with certain deductions, is quoted from a letter of Mr. Reed, in charge of a rail sawing plant at Wheatland, Pa.:

"In 1880 the usual Bessemer practice was as follows: In the blast furnace, ores naturally low in phosphorus and sulphur were used, the iron was produced much slower than to-day; after being cast into pigs, it was allowed to cool (come to rest molecularly), then selected on its chemical analysis, remelted into cupolas, and blow into converters in smaller quantities and also slower than at present, and it is fair to assume that more thoroughly 'cooked' and combined with its alloys. The resulting ingots (14 in. square) were allowed to cool (come to molecular rest), were stripped of their molds, and were then charged into horizontal furnaces, where they were heated much slower than now, and not so hot as present practice compels. When heated they were bloomed down to 7 in. square, in 13 passes keep in per pass through rolls. These 7 in. blooms were then allowed to cool (come to molecular rest), and then charged into another heating furnace, again being heated more slowly than in present practice, and then were rolled into rails of somewhat less average weight (say, 70 lbs.) than at the present time. Using a smaller bloom than now, even though making generally a lighter rail, there was less reduction of work necessary in the rolls, but it was slowly done, as 49 sq. in. of bloom were reduced to a 70-lb. rail in 13 passes, in a train running 400 ft. per minute. As a result of this deliberate and thorough working the steel was never subjected to violence, and was finished cooler, and this had a most salutary effect on its molecular structure.

"Comparing this old practice with that now in use, we find as follows:

"In the blast furnace, ores both high and low in phosphorus are used (i. e., some extremely low and others above the normal, as compensated), and the furnaces are driven at a high rate of speed. The metal, when reduced, is run, fluid, into a 'mixer,' but is never allowed to come to rest or cool. From the mixer it goes still fluid to the converter, and is blown hard and rapidly in less time than before and in larger amount. Then cast into ingots, which are not allowed to cool or come to rest, but are at once charged into heating furnaces, and held there until ready for blooming. They are then (with their contents in an unknown state, sometimes fluid, semi-fluid, pasty or granular) passed to the blooming mill and reduced from 16 x 18 in. (an average modern-sized ingot), having 288 sq. in. of area, to a bloom 8 in. square, having 64 sq. ft. of area, which is a reduction to 224 sq. in. in 11 passes, or 20.4 sq. in. of reduction to each pass (instead of 11.3, as formerly), which is nearly 100 per cent. faster, in addition to which the train is nowadays driven at a higher rate of speed than formerly. The 8 x 8 bloom thus produced is not allowed to cool, come to rest, and readjust its outraged and crushed particles, but is charged into a heating furnace and held hot, or in some cases proceeds without further heating direct to the rail mill, where it is reduced to a 70-lb. rail in nine passes (instead of 13), by rolls running 900 ft. per minute, instead of 400, as formerly, which is over 60 per cent. more rapid reduction, pass for pass, leaving out of consideration the speed at which it is done, which has an important bearing on the final result. Owing to all this haste, the rails finish at a high temperature, and the heads practically anneal and soften themselves on the cooling beds, but the annealing is useless and too late, as the mass of metal in the heads is, of course, open, friable grain, and poorly fitted to stand the abrasive action of car wheels under heavy loads."

When steel is allowed to cool without being subjected to work, it takes on a coarse, crystalling structure. If it is subjected to work while in the plastic state, the crystallization becomes smaller and smaller as the work is done at successively lower temperatures, until we reach the recalescent point.

The main difference between the present and former mill practice in making rails consists in a fewer number of passes and faster speed of train by which the finished pass is reached, while the metal is still at or above an "orange" heat (2,000 to 2,200 deg. F.). Whereas, in the older practice, with more passes and slower speed, it was finished at a "cherry-red" heat (1,400 to 1,600 deg. F.). The modern rails, as shown under the microscope, have a crystalline structure in the head, which cools last. The larger the section the slower the cooling and the coarser the crystallization. Rails finished at a dull red heat (1,300 deg.) have a fine granular texture throughout, as shown by experiments made by the Carnegie Steel Company.

It is our opinion that the wearing quality of the rails will be improved by taking more time for the finishing passes at the rolls.

This does not mean that the speed of the rail mill need be reduced, but that provision be made for holding a number of rails at a certain stage in the rolling, allowing them to come to a certain temperature, which will also mean that the heat retained in the rails will be distributed uniformly throughout. The rails are then taken in the order in which they have been held, and the finishing passes are taken at a lower temperature than present practice. Your Committee understands that patents have been taken out covering this improved method of rolling, and that in the near future we may expect rails with more work on them, insuring a better wearing surface and a better wearing rail.

Length of Rails.—There is probably more diversity of opinion at the present time on this point than any other. We have been advocates of 30-ft., 33-ft., 33-ft. 4-in., 45-ft. and 60-ft. rails. The transportation difficulty has been the governing feature in fixing at 30 or 33 ft., the latter being considered the longest rail that can be handled conveniently in present length of cars. The advocates of 45-ft. rail think 45 ft. about the maximum length that can be used with reasonable close-joint spacing. Then we have the 60-ft. rail, taking out 50 per cent. of our joints. It is the experience of a part of the Committee that 60-ft. rails can be laid with most excellent results on lines of easy grades and light curvature, with joints much closer than used in the average practice. It is believed that the best results will be obtained with 60-ft. rails when anti-creeping devices are used at least every 30 ft. The care of rail in laying and after laying, although of very great importance, is possibly second to some of the items mentioned. Thousands of tons of rail have been taken out of the track after short service on account of battered ends due to improper and wide spacing at joints. If your track is well and full ballasted there is little trouble to be anticipated by laying pretty close joints. If, however, you lay close joints and have your track half or quarter ballasted, look out for bad results in very hot weather. These matters will receive more attention from the Committee at a later time.

Specifications.—The Committee will recommend to your Association a standard specification for general adoption.

TECHNICAL.

Manufacturing and Business.

F. M. Pease, Chicago, has finished the delivery of 7,000 tons of rails to the Gulf & Ship Island Railroad.

Harry A. Norton, of Boston, Mass., is making an extended trip to Mexico and the Pacific Coast in the interests of the Norton ball-bearing jacks. He reports business as unsually good.

The works of the Canadian Locomotive & Engine Co., Ltd., at Kingston, Ont. (in litigation) are being offered for sale. Address A. F. Riddell or K. W. Blackwell, joint liquidators, 22 St. John St., Montreal, P. Que. The works are now running, having orders for six months ahead.

The Thornton N. Motley Co., 43 John St., New York City, is in the market for eight second-hand coaches, three combined baggage and mail cars, two combined passenger and baggage cars, two baggage cars and 60 freight car trucks for 50,000 lbs. capacity cars. These must be standard gage, in first-class condition.

The Railway Cycle Mfg. Co., Hagerstown, Ind., after April 1 will change its name to the Light Inspection Car Co., as the old name does not convey a definite idea of the kind of cars made. The personnel of the company will remain unchanged, and the business will be conducted as heretofore. For some time past the company has made only the Hartley and Teeter light inspection cars, and a new catalogue has just been issued descriptive of these cars.

F. P. Collier, who for the past nine years has been western manager for the Lappin Brake Shoe Co., has resigned his position to go into a general railroad supply business.

Shickle, Harrison & Howard Iron Co., of St. Louis, Mo., is furnishing its cast steel bolsters for 200 cars for the Cleveland, Cincinnati, Chicago & St. Louis; 360 for the Vandalia, 250 for the Northern Pacific, 400 for the Eastern Illinois, and 400 for the Kansas City, Fort Scott & Memphis.

The Berlin Iron Bridge Co., of East Berlin, Conn., has increased its capital stock to $750,000, and has bought land at Pittsburgh, Pa., where a branch will be started. Orders for the greater part of the necessary machinery and equipment have already been placed and the company is now at work on plans for the buildings, which will be designed and built at its own shops in East Berlin. It is intended that this plant shall be equipped with all modern appliances for doing all classes of steel bridge and structural work.

Iron and Steel.

Last week, in giving the organization of the Portland Iron & Steel Co., Portland, Me., we gave the name of A. H. Routwell as one of the directors. This should have read Rollin H. Boutwell. Mr. Boutwell is a large dealer in scrap iron and railroad supplies, with offices in Boston and Lowell, Mass.

John Griffiths, Superintendent of the Springfield Iron & Steel Works at Springfield, Ill., part of the Republic Iron & Steel Co., died at his home in that city last week of paralysis.

A bill before the Maryland House requiring railroads in Maryland to use only iron or steel bridges has been submitted to the Committee on Roads and Highways.

The Alabama Steel & Shipbuilding Co., on March 15 put in operation three more furnaces at its new $1,200,000 steel plant at Ensley, Ala., making six open-hearth furnaces now in blast.

The statement of operations of the Pennsylvania and the Maryland Steel Companies combined for 1899, which was submitted to the stockholders at the annual meeting last week, gives gross profits from operation, $2,330,171.44; additions to plant, charged to cost of manufacture, $423,223.26; dividend on preferred stock, $26,239.50; interest, $388,341.48; total, $414,580.98; amount charged to loss and gain and suspense, $119,992.36; net profit, $1,372,374.84.

The Wellman-Seaver Engineering Co. of Cleveland, O., has a contract with the Nickel Steel Co. of Hamilton, Ont., to design and build a large steel and iron plant in Canada, which will consist of four blast furnaces of about 700 tons capacity per day. In addition to the steel plant there will also be built a blooming, billet, rail and two plate mills. The entire plant will cost about $30,000,000. The new works are to be located on Hamilton Bay near Hamilton, Ont.

The Isthmian Canal.

A dispatch from Washington says that Mr. Alfred Noble and General Hains have sailed from Colon for New York and will arrive about the 22nd. The Commission is now examining the Panama Canal. The situation in Congress is quiet, but Mr. Hepburn seems to think that his bill will be passed this session.

Rapid Transit in New York.

It is now said that ground will be broken on the new underground rapid transit railroad in New York March 24. The start will be made at a point between the City Hall entrance and Park Row.

Electric Works for Vladivostok.

The State Department has received a telegram from Richard T. Greener, United States Consul at Vladivostok, saying that estimates for the construction there of an electric trolley tramway twenty miles long, electric lights and water-works had been prepared and that proposals were desired from the United States.

An Acetylene Gas Headlight.

At the January meeting of the Northwest Railway Club, Mr. J. M. Robb, General Shop Foreman of the Chicago Great Western, said that three or four engines on that road were equipped with acetylene gas headlights last summer, but the trials were not considered a success and the apparatus was removed. The principal cause of failure was due to the gas burning out before the water could get from one compartment, where the carbide had been exhausted, to the next compartment in the generator. Another serious objection to its use the year round was that the water in the generator would freeze in cold weather. He believes that the acetylene light might be a little more expensive than oil; but that it would be to the company's interest to use it if an apparatus was made in which the water would not freeze, and if a steady flow of gas could be insured. He said that if the acetylene gas headlight went out, the apparatus could be changed in a few minutes to the oil headlight, which can continually be kept ready for such an emergency.

The Standards of the Master Mechanics' Association.

Last June at the annual convention of the Master Mechanics' Association a committee was appointed to ascertain "to what extent the recommendations of the Association have been put into practice." This committee consists of Messrs. F. A. Delano, Angus Sinclair and Harvey Middleton. The committee found that as preliminary to this inquiry it would be necessary to have an index of subjects reported on and discussed from 1868 down to this time. Such an index has been prepared by Mr. Frank Zeleny, of Aurora, Ill., and from it a classified index has been made from which reports that still have interest or value can be selected. The committee has caused this general index and the classified index to be printed and circulated to the members of the Association in a pamphlet. Still further, the committee has taken the trouble to have subjects of present interest printed in larger type than the rest of the index. These include 88 separate references. The two indexes made a pamphlet of 30 pages, which is very valuable in itself, quite apart from the immediate object for which it was prepared. In sending out this index the committee asks members of the Association to reply briefly and promptly as to the

extent which the recommendations represent the present practice of the various railroad companies. Replies should be addressed to Mr. Delano.

Nickel Steel for Rails.

The Pennsylvania Railroad Company is making a limited experiment in the use of nickel steel for rails. These rails have been in track only a few months and no report has yet been made as to their performance. We have no particulars as to the percentage of nickel or of carbon in these rails, which we believe are of 100-lb. section.

The Rockville Bridge of the Pennsylvania Railroad.

The main line of the Pennsylvania Railroad crosses the Susquehanna River at Rockville, five miles north of Harrisburg. Travelers by that road will remember this picturesque location and the very long iron bridge, being about 3,700 ft. of deck structure. This bridge, built in 1873, is now to be replaced by a stone arch. There will be 48 of these arches, each 70 ft. in the clear and wide enough to carry three tracks. The contracts let so far are: Drake & Stratton, eight spans on the east end, and H. S. Kerbaugh, eight spans on the west end. The estimated cost of the complete bridge is about one million dollars. It is hoped that the 16 arches already let will be built before next winter.

The "Gem" Oil Can.

The Gem Manufacturing Co., of Pittsburgh, Pa., has brought out a new oil can which has, as a new feature, a simple device to prevent obstructions of the flow of oil through the spout. The bottom of the can is made from high grade carbon spring steel, and the body from the best grade of basic low phosphorus steel, pressed and drop forged into shape, flared and spun firmly against the bottom. The cans are all brazed throughout. The dirt ejecting device is made of piano wire, with one end projecting up nearly to the end of the spout and terminating below in a spring which is in a cage fastened to the nozzle base, as shown in the accompanying illustration. A firm but easy pressure downward on the brass ring on the spout pushes it down against the spring, and the end of the wire is forced up through the small end of the spout, freeing the opening. The spring also acts as a recoil, reducing the force of impact if the can is dropped on the point of the spout, making it less liable to permanent injury.

Long Island Railroad Improvements.

As noted last week, the Long Island Railroad has withdrawn its application for a franchise to build a tunnel under the East River. A bill has been introduced in the Legislature at Albany, which, if passed, will make it possible for the railroad to carry out its proposed improvements on Atlantic avenue in connection with the Atlantic Avenue Improvement Commission. This action is made necessary because of a clause in the bill passed about a year ago, which made the tunnel project a part of the railroad improvements along Atlantic avenue. The estimated cost of this work is about $2,500,000, one-half of which is to be paid by the city and the other half by the railroad. The plans were given quite fully in the Railroad Gazette May 5, 1899. It is proposed to sink the tracks of the Long Island Railroad from Atlantic and Flatbush avenues to Nostrand avenue, from which point to Ralph avenue an elevated structure will be built, and at Ralph avenue the tracks will again be put underground. Atlantic avenue is to be asphalted from curb to curb and the railroad company is to have the privilege of building a trolley line over the depressed road. If this improvement is made (and there seems to be good reason to believe that the present obstacles will soon be removed) the steam railroad will be electrified out to Jamaica and possibly further. The whole matter will be at a standstill until Senator Wagner's bill, which is now before the Legislature, is favorably acted upon.

The Master Mechanics' Association—Stationary Boilers.

To aid the Committee on The Best Type of Stationary Boiler for Shop Purposes a circular of inquiry has been sent out requesting information as follows:

1. From your experience, do you prefer locomotive type boiler with internal firebox, return tubular boiler bricked in, or water-tube boilers?
2. What experience with return tubular boilers in connection with super-heated steam, and what advantages are claimed for the latter?
3. Please state kind of grates used, whether stationary or rocker, and the width of openings between bars or fingers of grates.
4. The kind of fuel used, whether lump, nut or slack coal.
5. Diameter and length of tubes and ratio of grate area to heating surface per horse-power.
6. The evaporation, showing number of pounds of water per pound of fuel used, of the different types of boilers such as you have had experience with.
7. Your experience with automatic stokers; kind, cost of installation and maintenance, and do you consider them a good investment?

Replies should be addressed to the Chairman of the Committee, Mr. J. F. Dunn, Superintendent of Motive Power and Machinery, Oregon Short Line Railroad, Salt Lake City, Utah, not later than April 15 next. The other members of the Committee are Mr. J. J. Ryan and Mr. John Hickey.

THE SCRAP HEAP.

Notes.

The Canadian Pacific is preparing to adopt the American Railway Association's standard code of train rules.

It is reported that the Huntingdon & Broad Top Railroad, 63 miles long, has substituted telephones for telegraph instruments on its wire line which is used in transmitting train orders.

The Southern Pacific has made a new contract with the Pullman Palace Car Company under which the railroad company's ownership in the sleeping cars, which has been a considerable share, will be sold out to the Pullman Company.

Superintendent M. W. Maguire, of the Cincinnati, New Orleans & Texas Pacific, will hereafter have examinations and "schools" on train rules and other instructions for trainmen once a month, both at Chattanooga and at Somerset. Lectures are also to be given to the trainmen on "First Aid to the Injured."

In a case recently decided by the New York State Court of Appeals it is declared that the law of 1853, requiring that sign boards at highway crossings shall extend across the highway, is still in force and must be complied with; though there are thousands of signs in the State which do not extend across the roadway.

Representatives of Western millers, and other men interested in the shippers' side of the railroad problem, report that they have lately been stirring up members of Congress and that they hope to get some action taken on the Cullom bill at the present session. Hearings are to be held by the Senate Committee this week and next week.

One of the curious railroad regulations of Minnesota is a statute directing the Railroad Commission to take steps, whenever it shall see fit, to have the narrow-gage roads of the State converted into standard-gage lines; and a hearing is to be held on an application to have this law put into effect on the line from Preston to Wabasha.

Senator Cullom has introduced in Congress a bill prescribing detailed regulations under which railroad companies must send to the Interstate Commerce Commission reports of collisions and derailments of passenger trains, with a full statement, under oath, of the causes thereof; and also a report every month, also under oath, of all accidents to passengers or employes. The bill is proposed as an amendment to the act of March, 1893, the coupler and brake law.

The United States District Court at Detroit has declared invalid the ordinance passed by the Common Council of that city requiring the Citizens' Street Railway to carry passengers at three cents each. The decision, by Judge Swan, holds that the rights conferred by the original grant and the subsequent grants are vested rights and cannot be vacated or abridged without impairing the obligations of contracts. The assertion that the city can reduce fares from five to three cents by exercising police power is declared untenable. An attempt to do so is tantamount to an attempt to deprive the grantee of a vested right without compensation. Not even the Legislature could impair the right of the company to collect five-cent fares.

Grade Crossings in Newark, N. J.

The cost of track elevation in Newark, N. J., according to estimates submitted by the various railroad companies, are as follows: Lackawanna, $1,289,000; Central of N. J., $160,000, and Pennsylvania, $1,500,000; total, $2,949,000. The city's share of the cost, including the expense of raising the bridge of the Central Railroad across Pennsylvania Ave., is $962,000. The Board of Works Commissioners assert that the city should not be compelled to pay more than $500,000.

New Uniforms on Baltimore & Ohio.

The new spring uniforms of the Baltimore & Ohio men will, in some features, be different from those heretofore worn. The conductors will wear blue serge and the brakemen and baggagemasters a slate blue. On the peaked lapels of the coat will be the Baltimore & Ohio monogram in gold. All the caps will be of blue cloth, but of light weight, with longer peaks than the old ones. On those of the conductors the word "Conductor" will be worked in gold, while those of the brakemen and baggagemasters will bear a black celluloid card, lettered in gold. There will be no white caps, but conductors will be permitted to wear white vests.

American Locomotives as Patterns in Germany.

Consul General Mason, of Berlin, sends a translation from the Frankische Curier, Nuremburg, of an article dated Feb. 6, 1900, which says that a recent order by the Bavarian State Railways Administration for American locomotives from the Baldwin Works was solely for the purpose of enabling the details of construction of these engines to be studied by German builders; and so far as may seem advantageous, different features of the design will be adopted in future construction of engines.

Railroad Supplies for Russia.

Consul Halstead writes from Birmingham, February 19, 1900, that the London correspondent of the Birmingham Daily Post announces: "According to advices which have reached an official quarter here from St. Petersburg, tenders for the supply of two hundred locomotives and some thousands of goods trucks will be invited by the Russian Government in the early spring. The locomotives are to be of unusually heavy make and great power, capable of drawing a load half as heavy again as that allowed for the engines already being employed on the completed sections of the Siberian Railroad."

Traffic Notes.

The Canadian Pacific has reduced local passenger fares in Manitoba to the uniform rate of three cents a mile. In British Columbia the freight rates on certain of this company's lines have been materially reduced.

Press reports say that on April 1 the rates on coal from Pittsburgh to Chicago, and also to Buffalo and Eastern points, are to be raised 15 and 25 cents a ton. A smaller advance to Lake Erie ports was noted last week.

The new freight tariff recently issued by the Arkansas Railroad Commission was ordered to go into effect March 20. A circular was issued on the 14th modifying a large number of items in the tariff as originally issued.

Eastbound shipments from Chicago continue heavy, the total reported for last week being 150,519 tons. Fifty-nine vessels are now loaded with grain at Chicago waiting for the opening of navigation. There are about 30 more vessels near Chicago, but it is not certain that many of these will take grain, so that the opening movement is likely to be less than 6,000,000 bushels. It is said by competent observers that there will be 20 million tons of ore to be moved from Lake Superior this season and that therefore the railroads will get even a larger share of the grain from Chicago than they did last summer. The movement of coal westward will also be thrown largely upon the railroads.

Press dispatches from Chicago, Baltimore and other points report that the railroads are announcing an advance in the rates on export grain April 1. The increase is variously stated at fom 1½ cents to 2½ cents, and one account says that the advance is from the Mississippi River, but not from Chicago. It is stated that the Newport News differential will be made 1½ cents below New York, the same as the Baltimore differential. It will be remembered that this equality of differentials was agreed upon by the Trunk Lines about a year ago, but that after a few weeks the Chesapeake & Ohio reduced its rates to the basis of three cents below the New York rate, claiming that the company's business could not stand the smaller differential.

The decision of the New York State Court of Appeals in the case of Beardsley against the Erie, which has recently been handed down, declares unconstitutional, as concerns existing railroads, the law of the State requiring railroads to issue 1,000-mile tickets, good for bearer, at two cents a mile. The statute is declared to be a taking of property without due process of law, or, apparently, in other words, a violation of the contract between the State and the railroads implied in the charters. It is declared that the law is not a regulation fixing maximum prices, but is simply an enactment in favor of persons who are able to purchase mileage books. In the case of a new railroad, chartered since the law was passed, the regulation would be valid.

The Attorney-General of Nebraska has filed suits against the Burlington, the Elkhorn and the Omaha roads for failure to reduce freight rates as required by the law of 1897. At the same time the State Board of Transportation has brought suits to compel compliance with orders recently issued by the Board requiring heavy reductions in rates on corn, hogs and cattle. There seems to be no unity of purpose between the different State authorities and it is difficult at this distance to see what they expect to accomplish, though it is plain enough that the general purpose is the same in all the actions which have been taken to wit, to try to show that the laws of the State require lower rates and that these laws are valid and effective. It will be remembered that the decision of the United States Supreme Court in 1898 did not completely and unequivocally annul the freight rate law.

The Interstate Commerce Commission, in the case of Danville, Va., against the Southern Railway, involving alleged discrimination in rates against that city, has ordered the company to readjust its rates on a reasonable basis. The opinion of the commission says:

"The system of rate-making into Southern territory under which, on traffic from St. Louis, Chicago and other points, the rates to Danville are the sums of locals to and from the Ohio River, and the rates to Lynchburg are made on a much lower joint rate basis, is utterly unreasonable.

"The rates from northern and eastern cities to Danville and the rates from New Orleans to Danville on sugar, molasses, rice and coffee should not exceed those to Lynchburg by more than 10 per cent. The rates between Danville and the West, including the rate on tobacco to Louisville, should not exceed those between Lynchburg and the West by more than 15 per cent."

The case is held open and orders suspended to await readjustment of rates by the Southern Railway and connecting carriers.

Chicago River.

On March 12 the Engineering Committee of the Chicago Sanitary District, which is composed of all the Trustees of that District, passed unanimously a resolution favoring the assumption of the control of the main and south branches of the Chicago River by the Sanitary District, the replacing of all center pier bridges by bascule bridges and the policing of the river by dispatch boats to direct the movements of vessels and prevent accidents. This is based on the proposition that the main channel and the south branch of the Chicago River are parts of the drainage canal, and that the Drainage Board is under some legal obligation to remove obstacles that may tend to prevent a compliance with the sanitary act. It is proposed to issue $3,000,000 of bonds to supply the Sanitary District with the necessary money and to begin work as soon as the Drainage Board and the city officials have agreed upon a plan of joint operation. It must also be decided whether the city has the power to relinquish the control of the river.

Illinois Deep Water-Way Project.

The Board of Trustees of the Chicago Sanitary District, the Illinois River Valley Association, Mayor Harrison and Commissioner of Public Works McGann of Chicago, President Lyons of the Chicago Board of Trade and others interested in the proposed canal to connect Lake Michigan and the Gulf of Mexico, presented a petition to Congress at Washington,

March 16, asking for a government survey of the proposed canal, the building of which it is estimated would cost $20,000,000.

Chicago Street Paving Contracts.

Plans have been made for paving more than 80 miles of streets this season at a cost of $4,000,000. Bids on work amounting to $750,000 were opened last week and within a few days bids amounting to $500,000 more will be received. It is proposed to complete a large part of the paving by Aug. 1. Prices of asphalt are from $1.90 to $2.47 a sq. yd., brick from $1.85 to $2.10, cedar from $1.10 to $1.15 and granite from $2.90 to $3.35.

The Siberian Railroad.

From the official report of the Imperial Russian Railroad management, the following statistics are taken, showing the business done on the Western and Middle portions of the Siberian Railroad, and includes both passenger and freight traffic for the years 1896, 1897 and 1898:

Travelers:	Western.	Middle.
1896	160,000	15,000
1897	236,000	177,000
1898	350,000	300,000
Freight, metric tons:		
1896	189,000	18,240
1897	387,600	97,370
1898	541,600	196,600

The number of the travellers is for the paying passengers only, and does not include the 400,000 prospectors, government employes, workmen, etc., who were carried free. In 1898 there were carried on the Western Siberian Line 320,000 tons of grain for export. One continually increasing item represents the exports of Chinese tea, not only to European countries, but also to North Africa, which has heretofore received these goods almost exclusively by the Suez Canal. The Government intends, as already reported, to speedily improve the roadbed and tracks, and with the introduction of heavy locomotives to make better time with trains, especially with freight trains, which now run at only about 10 km. per hour; also to increase the number of stations, these being now on an average 50 km. apart. A corresponding increase in the number of local stations and stopping places will also be made.

The Man Who Killed Wattson.

The reader will remember that in 1896 Edward Clifford, a discharged employe of the West Shore Railroad, shot and killed W. G. Wattson, Superintendent of that road. Clifford was convicted of murder and sentenced to be hanged Sept. 17, 1896. So far his life has been saved by various legal processes and now a third appeal is taken to the Supreme Court of the United States. There can be little doubt that Clifford is now insane, but it has been argued that he was not responsible for his actions at the time of the murder.

South American Notes.

Both Chambers have agreed to the proposals of the Rio Negro Salt Co., Ltd., Balcarce 346, Buenos Aires, for the navigation of the Rio Negro and the construction of a railroad between Patagones and San Blas. Wharves, moles, etc., are also to be built by the company.

A line of railroad connecting Sao Paulo and Bahia, Brazil, is now projected to start from the Conquista Station on the Mogyana Ry., and to pass through Arana, Sacramento, Bagagem and across the Serra dos Piloes to Paracatu. The terminal point will be the port of Burity on the Paracatu, an affluent of the River Sao Francisco. The length of the line will be 311 miles, for which a grant is to be requested from the States interested. Dr. Caetana Cesar de Campos is the Director-General of Ways and Works, and will in all probability have charge of this work; address, Rua Maria Jose, 3, Rio de Janeiro.

Technical Schools.

University of Illinois.—Work on the new Agricultural Building is progressing rapidly and when completed it will be the largest of its kind in this country. The building is of brick and stone with slate roof and is built in four parts around an open court and connected by corridors. The main building is 248 ft. long, from 50 to 100 ft. deep, and three stories high. The wings are 45 ft. x 116 ft., and two stories high.

Purdue University.—About 60 engineering students of the senior and junior classes were in Chicago this week on the annual inspection trip to railroad shops and manufacturing plants. Profs. Goss, Goldsborough and others accompanied the party. On Thursday evening a banquet was given to the visiting party by the Purdue Alumni Association, of Chicago.

LOCOMOTIVE BUILDING.

The Carnegie Steel Co. is having one engine built by the Baldwin Locomotive Works.

The Cammal & Black Forest has ordered one locomotive from F. M. Pease, of Chicago.

The Chicago & Alton has ordered five switching locomotives from the Baldwin Locomotive Works.

The West Virginia Central & Pittsburgh is having two engines built by the Baldwin Locomotive Works.

The White Pass & Yukon has ordered from the Baldwin Locomotive Works the two engines referred to Feb. 23.

The Atkinson & Northern, now building, will want 25 locomotives. B. E. Sturdevant, of Atkinson, Neb., is President.

The Mexican International has ordered five engines from the Cooke Locomotive & Machine Works, in addition to the four referred to Jan. 12.

The Central Vermont, we are officially informed, will possibly order some new locomotives, but none has been ordered as yet, nor have bids been asked.

The John Arpin Lumber Co., of Grand Rapids, Wis., expects to be in the market for one 25-ton locomotive for use in connection with the Chippewa Valley & Northern road.

The Chicago, Milwaukee & St. Paul has asked bids on 32 10-wheel freight engines, 25 of one class and seven of another. Ten passenger locomotives are also being considered.

The Chicago, Rock Island & Pacific order with the Baldwin Locomotive Works, referred to last week, calls for six 10-wheel engines of the Vauclain compound type for high-speed passenger service.

CAR BUILDING.

The Illinois Central is considering ordering 10 baggage cars.

The St. Louis & San Francisco is getting prices on 500 box cars.

The Flint & Pere Marquette has ordered 50 flat cars from the American Car & Foundry Co.

The Penn Gas Coal Co. has ordered 100 coal cars from the American Car & Foundry Co.

The National Rolling Stock Co. has ordered 125 cars from the American Car & Foundry Co.

The Gulf & Ship Island has received four parlor cars and 50 box cars, ordered from F. M. Pease.

The Chicago & Eastern Illinois has ordered 100 steel gondola cars from the Pressed Steel Car Co.

The St. Louis Southwestern has ordered eight passenger cars from the American Car & Foundry Co.

The Louisville, Henderson & St. Louis is having three passenger cars built by the American Car & Foundry Co.

The International & Great Northern has ordered 400 box cars of 60,000 lbs. capacity from the American Car & Foundry Co.

The Texas & Pacific order, referred to Feb. 16, is for 650 instead of 500 cars. The contract calls for part flat and part box cars.

The Ohio Central is said to have ordered five passenger coaches from the Pullman Co., to be equipped with wide vestibules.

The Delaware, Lackawanna & Western has ordered 100 steel hopper bottom coal cars from the Pressed Steel Car Co.

The American Steel & Wire Co. has ordered 300 flat bottom steel gondola cars of 100,000 lbs. capacity from the Pressed Steel Car Co.

The Chicago, Burlington & Quincy is reported to have ordered materials for 270 more furniture cars to be built at its own shops.

The Colorado & Southern order with the American Car & Foundry Co., referred to March 9, calls for 15 instead of four passenger cars.

The Omaha Packing Co.'s order with the American Car & Foundry Co., referred to March 9, calls for 50 beef cars in addition to the 150 refrigerators.

The Wabash, it is expected, will let a contract within a few days for 3,000 box cars of 60,000 lbs. capacity and 500 gondola cars of 80,000 lbs. capacity.

The Kansas City, Fort Scott & Memphis has increased the order with the American Car & Foundry Co. referred to Feb. 16, from 200 to 400 box cars, and has also ordered 200 cars from the Southern Car & Foundry Co.

The John Arpin Lumber Co., of Grand Rapids, Wis., expects to be in the market for about 30 logging cars, two box cars, one combination car and eight flat cars, for use on the Chippewa Valley & Northern road, now building.

The Atkinson & Northern, now building, will require 1,500 freight cars, two chair cars, 10 coaches, six combination passenger and baggage cars, one official car, two mail cars, three baggage and express cars, two combination mail and express cars and 10 cabooses.

The Boston, Revere Beach & Lynn has ordered nine passenger cars from Osgood Bradley & Sons, for June 1 delivery. They will have wooden brake beams, Eames vacuum brakes, Ajax metal brasses, Miller hook couplers, printed duck curtains, Miller draft rigging and platforms, Wheeler seats, Detroit springs and Boston Car Wheel Co.'s 30-in. chilled wheels.

The Rio Grande Western is having nine passenger cars built by the Pullman Co. for April delivery. Part of them will be 55 ft. and part 60 ft. long. They will be equipped with steel axles, wrought iron plate bolsters, National hollow brake beams, Westinghouse air brakes, National couplers, Pullman standard draft rigging, Baker heaters and Safety system of steam heat, Fletcher journal-box lids, steel platforms, wide vestibules, Paige wheels and French springs, and will be lighted by Pintsch gas.

The Boston Elevated has ordered 50 cars for its surface lines from Osgood Bradley & Sons.

The Metropolitan Elevated (Chicago) has ordered from the American Car & Foundry Co. the 56 cars noted March 9. They will be built at the St. Charles works.

The South Side Elevated of Chicago has ordered 30 of the 50 passenger cars noted March 9 from the Jewett Car Co., of Newark, O. They will be 46 ft. 5¾ in. long over all and will weigh complete with trucks, but without motors, 50,000 lbs. They are to be finished inside in mahogany and will have plate glass windows, Pantasote curtains, spring seats covered with rattan, Peckham trucks, Christensen air brakes and Van Dorn couplers. Each car will have a separate cab for the motorman like those on cars now in service. The platform gates will extend from the platform floor to the hood of the car, making practically a vestibuled train when the gates are closed.

BRIDGE BUILDING.

AUBURN, IND.—Contracts were let April 8 for six bridges varying in length from 22 ft. to 40 ft. The Wabash Bridge & Iron Works secured the contract for three and the Lafayette Bridge Co. the other three. Bids for an 84-ft. structure were rejected. There were 17 bidders.

BETHANY, MO.—A bridge is proposed over the Big Creek at Butter Ford, eight miles south.

BOSTON, MASS.—The bridge proposed over the New York, New Haven & Hartford at Mt. Bowdoin will be a footbridge estimated by the City Engineer to cost $6,300.

BRADFORD, PA.—The Mayor, in his annual message, states that the bridges on Foreman and Barbour Sts. are dangerous and should be replaced by new bridges at once.

BRISTOL, CONN.—The Board of Selectmen is considering building an iron bridge over the Pequabuck River at East Bristol; also a new bridge at Center St.

BUFFALO, N. Y.—Bids are wanted until March 27 for the superstructure of the Seneca St. bridge over the Buffalo River. R. G. Parsons, Secretary of the Board of Public Works. (March 9, p. 159.)

CHICAGO, ILL.—The City Engineer is preparing plans for the Sanitary District bascule bridges at State, Madison, Washington, Randolph and Dearborn Sts., some of which will be included in the City Council's annual budget.

The Finance Committee, in addition to providing for new bridges, as recently reported, has set aside $400,000 for bridge repairs. (March 16, p. 175.)

The bridge for which the Department of Public Works will receive bids until May 15 is to cross the Calumet River at Ninety-fifth St., not Fifty-ninth St., as erroneously stated last week. L. E. M'Gann, Commisioner of Public Works.

The contract for building a bascule bridge over the Chicago River at Canal St. was let on Mar. 12 to Roemheld & Gallery, the lowest bidders, for $127,000. It is to be completed by Dec. 15 next.

CLEVELAND, O.—The City Engineer has estimated the cost of a viaduct over Kingsbury Run connecting Tod St. at Kingman and Francis Sts. It will be similar to the Superior St. viaduct, 780 ft. long, 40 ft. roadway, two sidewalks 8 ft. wide each, costing $150,000.

The King Bridge Co. got the contract for rebuilding the Willson Ave. bridge superstructure at a cost of $13,600, for which bids were received on March 10. The other bidders were the Variety Iron Works Co., $14,205, and the Youngstown Bridge Co., $14,264. The Wrought Iron Bridge Co. made an informal bid.

COHOES, N. Y.—Arrangements have been made to eliminate the crossing at High St., at a cost of $50,000.

DES MOINES, IA.—The Des Moines Bridge & Iron Works has been incorporated in Iowa, with a capital stock of $40,000, to make and build bridges and structures made from steel, etc. The incorporators are E. W. Crellin, W. H. Jackson and B. N. Moss.

DULUTH, MINN.—A bridge will be built over the St. Louis River on the road between Duluth and West Superior, Wis., by the Eastern Ry. of Minnesota.

Bids are wanted April 1 for the substructure of the bridge at Garfield Ave. (Feb. 23, p. 126.) Thos. F. McGilvray, City Engineer.

EAST CLALLAM, WASH.—Bids are wanted April 3 for a bridge across the Solduck River by Clallam County.

EASTON, MD.—A joint committee of the Boards of County Commissioners of Talbot and Caroline counties is considering replacing the old wooden Dover bridge with a steel structure, estimated to cost $13,000.

FAIR OAKS, CAL.—The Board of Supervisors has been petitioned for a bridge across the American River in the vicinity of Fair Oaks.

FITCHBURG, MASS.—It is stated estimates are being made for a bridge from Fifth to Howard St., to cross the river and the railroad tracks. It will be about 650 ft. long and cost, according to estimates of the Groton Bridge & Mfg. Co., $50,000.

GRANTON, ONT.—W. D. Stanley, Township Clerk, wants bids April 2 for the superstructure of a bridge over the River Sauble.

GRAND RAPIDS, MICH.—City Engineer Geo. M. Ames informs us that it is proposed to build a concrete-metal bridge of 64 ft. span over the East Side canal at Bridge St., the full width of the street—100 ft. The present plate girder bridge, 66 ft. wide, will be placed over the West Side canal where the street is 66 ft. wide. This arrangement will have the effect of widening and extending the arrpoaches to the bridge over the river, and materially shorten the bridge necessary to replace the old one, which will not be replaced this year. (March 16, p. 176.)

Two estimates have been made for rebuilding a bridge at Wealthy Ave., according to report.

JASPER, ALA.—Bids for the bridge across the Sipsey River are wanted April 6. The main span is 144 ft. and the two approach spans are 90 ft. each. Address James W. Shepherd.

KING, ONT.—King Council will build a bridge over the Humba River.

KOKOMO, IND.—The Howard County Commissioners want bids on four steel bridges for Prairie and Cicero Townships.

LOCKPORT, N. Y.—Bids are wanted by the Department of Public Works, Albany, for a lift bridge over the Erie Canal at Chapel St.

NEWAYGO, MICH.—The bridge proposed across the Muskegon River by the Township of Garfield will be steel, 250 ft. long of two spans. Bids will be wanted soon. The total estimated cost is placed at about $20,000. Frederick Jacobi, Village Trustee.

NEWPORT NEWS, VA.—Plans have been prepared for the proposed Twenty-eighth St. bridge. With approaches the structure will be 1,740 ft. long. It will be 59 ft. wide.

PERRYSVILLE, IND.—A bridge proposed over the Wabash River near this place is estimated to cost $18,000. Bids are wanted at once, according to report.

PHILADELPHIA, PA.—Surveys are being made to open Seventeenth St. from Cambria St. to Indiana Ave., which will require a bridge where it will cross the Philadelphia & Reading.

RENSSELAER, N. Y.—It is stated that a bridge across the Boston & Albany and the New York Central at Third Ave. will be built.

SAPULPA, I. T.—The St. Louis, Oklahoma & Southern Ry. is receiving bids for eleven steel bridges as follows:

	Span.	Kind.
Polecat Creek	100 ft.	Through span.
Adams Creek	70 "	Girder.
Deep Fork	150 "	Through span.
North Canadian River	150 "	" "
Wewoka Creek	100 "	" "
Little River	100 "	" "
South Canadian River, 2 spans, each 308 ft	616 "	" "
Little Blue River	50 "	Girder.
Three Mile Creek	50 "	"
Washita River, 2 spans, each 150 ft	300 "	Through span.
Rock Creek (near Denison)	50 "	Girder.

ROCKVILLE, PA.—The bridge which the Pennsylvania RR. wil rebuild over the Susquehanna River at this place is mentioned among the Technical notes in this issue.

SARINA, ONT.—The Clerk of Lambton County wants bids up to April 4 for building a steel bridge.

SOUTH BEND, WASH.—The Surveyor of Pacific County is surveying for a new county road between South Bend and Wallapa which will need a drawbridge across the South Fork.

SOUTH ZORRA, ONT.—The King Bridge Co., of Cleveland, O., has the contract for the steel highway bridge for which bids were received March 3. There were four other bidders. (Feb. 23, p. 126.)

STRATFORD, ONT.—The City Council is considering building the proposed John St. bridge.

TERRAL, I. T.—Plans and specifications, according to report, have been made by the Chicago, Rock Island & Pacific for a bridge across the Red River which will probably cost $100,000.

TYRE, N. Y.—The Department of Public Works is authorized to build a bridge across the Seneca River near Montezuma and also across the Canandaigua River.

UTICA, N. Y.—The bridges proposed over the Mohawk River at Genesee St. and Park Ave. are estimated to cost about $65,000.

UXBRIDGE, MASS.—It has been decided to build a new bridge at Calumet.

WATFORD, ONT.—Bids are invited by Paul Kingston, Box 200, up to March 24, for a bridge.

YUTAN, NEB.—The Commissioners of Saunders County have been petitioned for a bridge across the Platte River near this place.

Other Structures.

AUGUSTA, GA.—Two designs by Mr. Grant Wilkins of Atlanta, and Mr. Lewis F. Goodrich of Augusta, have been made for the proposed new union depot to be built in this city.

ASHTABULA, O.—The Lake Shore & Michigan Southern will make extensive improvements in this vicinity, including building a car repair shop 160 x 40 ft., a new four-track bridge across Ashtabula Creek, passenger stations at Conneaut and Geneva and new docks on the lake front.

CHESTER, PA.—The Seaboard Steel Casting Co. (Mar. 9, p. 159), has been incorporated in Pennsylvania, with a capital of $500,000. Among the stockholders are John P. Roach and W. C. Sproul, of Chester; J. Henry Cochran, Williamsport; C. L. Magee, Pittsburgh; Edwin Cramp, C. A. Porter and Joseph Wharton, Philadelphia; Millard Saulsbury and Thos. H. Savery, Wilmington, Del. The first building to be built will be a foundry and machine shop for the steel casting plant, 80 x 650 ft.

DETROIT, MICH.—The American Car & Foundry Co. is considering building a new plant to make steel cars at Detroit.

ELKHART, IND.—The Lake Shore & Michigan Southern is considering building a new passenger station at Elkhart, but no plans have been decided upon.

FLINT, MICH.—The works of the Armstrong Steel Co. were destroyed by fire March 4. The loss is estimated at $150,000.

MIDDLETOWN, N. Y.—The carpenter and repair shop of the New York, Ontario & Western and several cars were destroyed by fire Mar. 20. The loss will probably exceed $40,000.

NEW YORK, N. Y.—The Jamaica Bay Dock Co. has been incorporated in New Jersey, with a capital of $150,000, by Chas. W. Bennett and Peter Whitney of New York and William M. Klink of Jersey City, N. J., to build a bulkhead about half a mile long on the water front in Brooklyn, between Canarsie and Bergen Beach; also piers, docks, warehouses, etc.

PARKERSBURG, W. VA.—The new plant of the Damascus Steel Co. of Pittsburgh, being removed to this place, will consist of two buildings, one 50 x 300 ft., to be used as a rolling department, and the other 60 x 100 ft., to be used as a forging and hammer shop. The latter will contain five steam hammers, ranging from 600 lbs. to five tons.

PITTSBURGH, PA.—The Oliver Iron & Steel Co. has let a contract for a new plant, to cost $150,000, at South Fourteenth St., adjoining the present works, where wagon iron and carriage material will be made.

ST. PAUL, MINN.—The Great Northern is preparing to enlarge and remodel its shops at St. Paul and will add new tools and equipment. The total cost of the improvements will be from $250,000 to $400,000.

SHARON, PA.—The Sharon Steel Co. has let a contract to R. S. Newbold & Son Co. of Norristown, Pa., to build a 10-mill tin plate plant, ten hot and nine cold rolls, work to be begun at once. The foundations to the work are being built by the Sharon Steel Co. (Sept. 15, 1899, p. 648.)

SHOUSTOWN, PA.—The Pittsburgh Sheet Mfg. Co. proposes to enlarge the works by building a 20 x 200 ft. building and adding two new sheet mills, making it a four-mill plant.

TROY, N. Y.—It is stated that plans are completed for the proposed new station by the New York Central & Hudson River at Troy.

WILKESBARRE, PA.—Regarding the reports that the Lehigh Valley will build a new freight house on Northampton St., we are told that, while the company contemplates doing something at this point, nothing definite has been decided.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xii.)

Canadian Society of Civil Engineers.

At the meeting of March 15, the fourth of a series of lectures on "The Transmission of Electrical Power," was delivered by Professor R. B. Owens, M. Can. Soc. C. E.

Franklin Institute

At the stated meeting of the Mining and Metallurgical Section to be held April 8 at 8 p. m., the paper of the evening will be "Railway Bearings; a Study in Structure," by Mr. Robert Job of Reading, Pa.

The New York Railroad Club.

At the March meeting of the New York Railroad Club Mr. W. L. Derr, Superintendent of the Susquehanna Division, Erie Railroad, presented a paper on "Railroad Water Supply. This pamphlet of 28 pages, with numerous illustrations, is a very good compendium of practice.

The Engineering Association of the South.

The regular monthly meeting was held on the evening of March 8, at the office of President Geddes, Nashville, Tenn. There were present 12 members.

The committee appointed to prepare a memorial sketch of the life-work of P. J. Carr, deceased member of the Association, made a report which was accepted and ordered printed in the quarterly publication. The death of Mr. John MacLeod, charter member of the Association, was announced, and Mr. Chas. Hermany was appointed a committee to prepare a memorial sketch.

The committee appointed at the February meeting to consider the matter of formation of local sections of the Association made a report, in which it was recommended that such a step should be taken, and submitting a plan. The report was discussed and accepted. The Secretary was instructed to have said report printed and issued to the members, and also to distribute same in all localities where it might be considered possible to organize a local section.

The paper of the evening, "Gas Engines and the Economy of Gasoline Engines for Small Power," was presented by Mr. John Wilkes, Engineer of the T. C. I. & R. R. Co., at Whitwell and Tracy City, Tenn., mines. The cost of operation of several gas engines, varying in horse power from two to thirty, under the writer's supervision was given, the figures showing low costs. For small power and at isolated locations the gas engine was declared to fill a long-felt necessity. However, it was shown that the gas engine might yet be greatly improved along the lines of simplicity of construction, more efficient manner of starting, and steadiness in running. The paper closed with the expression of the opinion that the future would see rapid development of this power and the adoption of such engines in greatly increasing numbers.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. B. C. Howard, Master Mechanic of the Grand Island (Neb.) shops of the Union Pacific, died March 15.

—Mr. C. F. Kennedy, the new Assistant Superintendent of the Worcester Division of the New York, New Haven & Hartford (p. 161), was born in Boston, Aug. 18, 1856. He began his railroad career in 1882 as Telegraph Operator on the Boston & Maine. Mr. Kennedy has since been connected with different roads, holding such positions as Train Dispatcher, Trainmaster and Acting General Yardmaster.

—Mr. Robert M. Shanley, a great contractor, died at his home in Newark, N. J., last Monday night. He was born in Newark Nov. 1, 1847, and was graduated from that fine old school, the Newark Academy. He has done a great deal of important contracting work, particularly on railroads, and has been almost a fixed institution on the Pennsylvania, in which he was a large stockholder. He has lately been greatly interested in electric railroads in Northern New Jersey and was influential in bringing about some of the great recent consolidations.

—When the San Francisco & San Joaquin Valley is completed into San Francisco, as it will be in a few weeks, Mr. W. B. Storey, Jr., its Chief Engineer, is to become Chief Engineer of the parent company, the Atchison, Topeka & Santa Fe. Mr. Storey is a native of San Francisco and was born 42 years ago. He began railroad work as a flagman in a surveying party in 1876. He was graduated from the University of California in 1881, and from that time until 1893 he was with the Central Pacific and its successor, the Southern Pacific, in the Engineering Department. He has been with the San Francisco & San Joaquin Valley since 1895.

—Mr. J. J. Thomas, Jr., who has been made Assistant to the Superintendent of Motive Power and Car Equipment of the Mobile & Ohio at Moblie, Ala., was born at Calera, Ala., Oct. 18, 1864. He began railroad work as a fireman on the Selma, Rome & Dalton in 1880. He was graduated from Dallas Academy in 1881, and for seven years following served with the East Tennessee, Virginia & Georgia as machiist's apprentice, machinist, fireman and engineer. For eleven years following 1887 he was with the Birmingham & Atlantic as engineer, general foreman, and after 1891 as Master Mechanic. He served as Master Mechanic of the Mobile & Birmingham for two years following 1896, and then went with the Mobile & Ohio as Master Mechanic of the Tuscaloosa shops. His recent promotion came on Feb. 15.

—Mr. R. T. McKeever, as previously noted, has been made General Manager of the new Copper Range RR. Mr. McKeever was born in New York City July 20, 1866. He entered railroad service with the Northern Pacific in the Auditor's office at St. Paul, Minn. In 1889 and 1890 he was in the General Manager's office of the Northern Pacific & Manitoba at Winnipeg. In 1891 he became Assistant to the General Manager and Purchasing Agent of the Adirondack & St. Lawrence, now a part of the New York Central, at Herkimer, N. Y., and Trainmaster and Assistant Superintendent of the same road in 1892. For the six years following he was General Superintendent of the Fonda, Johnstown & Gloversville at Gloversville, N. Y.; then for one year General Passenger Agent of the Rutland, which position he left last February for his present appointment.

—Last week we noted the appointment of Mr. A. C. McCord, of Chicago, to be the active managing officer of the Illinois Car & Equipment Co. of that city. Mr. McCord was born in Edgar County, Ill., in 1867, and graduated from Princeton College in 1899. He then studied law for one year at the University of Minnesota and in 1890 went into business in Chicago as Vice-President of the Drexel Railway Supply Co. When the firm of McCord & Company was organized in 1896 Mr. McCord become President, and he still holds the Presidency of that corporation, in addition to his new position as General Manager of the Illinois Car & Equipment Co. During the ten years of his active business life, Mr. McCord, by his upright and honorable character and unfailing courtesy, has won the respect and esteem of all those with whom he has come in contact.

—Mr. R. J. Van Cleve has left the service of the Great Northern to become Master Mechanic of the new Klondyke road, the White Pass & Yukon. Born at Little Falls, Minn., on April 6, 1859, he was educated in the public schools of Minneapolis and at the Minnesota State University. His first railroad work was as telegraph operator during his summer vacations of 1876 and 1877 on the St. Paul & Pacific, now the Great Northern. He served on the St. Paul, Minneapolis & Manitoba (Great Northern) for three years from October, 1878, as operator, brakeman and fireman. For the following nine years he ran an engine on the same road. In 1891 he was made General Foreman of the Great Northern, with headquarters at Great Falls, Mont., and in August, 1892, he became Division Master Mechanic of the Kalispell Division, the position which he held up to the middle of January last, when he resigned to accept his position on the White Pass & Yukon.

—We noted last week the appointment of Mr. Russell Harding, heretofore Vice-President and General Manager of the St. Louis Southwestern, to the position of General Manager of the Missouri Pacific, succeeding Mr. W. B. Doddridge. Mr. Harding was born in Springfield, Mass., in 1856. His first railroad service was under his father as paymaster and timekeeper on the Portland & Ogdensburg, and in 1877 he took the position on the same road as station agent, operator and ticket agent. After four years of service he became Assistant Engineer on the International & Great Northern of Texas during the building of that year. Six years later he became Chief Engineer and Superintendent of Construction of the same road. In 1894 Mr. Harding became Superintendent of the Dakota Division of the Great Northern, and two years later General Superintendent of the Western District of the same road at Spokane, Wash. Four months later he was advanced to the Assistant General Superintendency of the system. In 1898 he was elected Vice-President and General Manager of the St. Louis Southwestern. An count of Mr. Harding's career, with a portrait, appeared in the Railroad Gazette for Nov. 11, 1898.

—The new Chicago, Peoria & St. Paul Ry., which is the successor company to the Chicago, Peoria & St. Louis and the St. Louis, Chicago & St. Paul, is to have as General Manager Mr. Curtiss Millard, who was Superintendent of both roads prior to their reorganization. Mr. Millard was born at Egremont, Mass., in 1862. His first railroad work was in the engineer corps of the West Shore in 1881. He passed through various grades from chainman to Assistant Engineer, until 1884, when the road was completed to Buffalo. For five years following he was Assistant Engineer on the new Croton Aqueduct, and for the two years following Engineer for the contractor in charge of building a storage reservoir and dams in Putnam County, N. Y., for the aqueduct. In 1891 he became Chief Engineer and afterward Superintendent in charge of maintenance, traffic, and operation of the Charleston, Sumter & Northern, now a part of the Atlantic Coast Line. For a year following 1895, he was Assistant to the General Freight and Passenger Agent of the Baltimore, Chesapeake & Atlantic. He then entered the service of his present system as Chief Engineer of the St. Louis, Chicago & St. Paul. In 1897 he was made Superintendent of the same line, and the year following a similar position was added on the Chicago, Peoria & St. Louis.

—We noted briefly last week, page 177, the death of Mr. C. H. Coster, of the firm of J. P. Morgan & Co. Below are extracts from the minutes adopted by the Board of Directors of the Erie Railroad: "Charles Henry Coster, a member of the Board of Directors and of the Executive Committee of the Erie Railroad Company, died March 13. With deep personal grief, and conscious of the loss suffered by this company and this board, his fellow-directors, desiring to attest the high character, the genial disposition and the great capacity of Mr. Coster, unanimously adopt this minute:

"Intrusted by Mr. Morgan with the responsible and difficult task of managing the reorganization that resulted in the formation of this company, Mr. Coster, with unswerving fidelity, overcame every difficulty and accomplished his whole duty, so that, more than any of its officers, he was justly considered the founder and the controlling mind of this corporation. With undoubting confidence his fellow-directors willingly followed his lead, and never were led astray. Invariably the result justified their ready acceptance of his suggestions, which always were presented with lucidity, with fairness, and with courtesy. From its foundation to the very last days of his life Mr. Coster gave to this company his best service and thought, and none could be better.

"Without exaggeration, it may be declared that an irreparable loss has been suffered by this company, by this commercial community, and by the legitimate corporate interests of this country. It is the judgment of his colleagues that in breadth of view, in accuracy of comprehensive knowledge, in fertility of resource, and, above all, in unswerving integrity and clear sense of justice, as an administrator of corporate affairs, Charles Henry Coster had no superior."

—We gave last week a very short note in this column concerning the election of Mr. F. S. Curtis as Fourth Vice-President of the New York, New Haven & Hartford Railroad. We are able now to give further particulars of his career. He was born in Owego, N. Y., and he attended the Owego Academy until he was about 20 years of age, taking a special course in civil engineering. From the summer of 1863 until 1870 he was employed on the location and construction of various railroads and then for a year was employed in making surveys for the towns of Tremont and Fordham, now in New York City. In 1871 he was employed by the Harlem River & Portchester Railroad in the location of the line between New Rochelle and the Harlem River, and in the fall of that year undertook for the New York & Harlem

Railroad Company the location of tracks, yards, etc., at Grand Central Station, after which he was Principal Assistant Engineer, in the preparation of plans and later in the construction of the Fourth Avenue Improvement between Grand Central Depot and Harlem River.

In 1874 he was appointed Chief Engineer of the New York & Harlem RR., and Superintending Engineer of the Fourth Avenue Improvement, continuing in the employ of the New York & Harlem and New York Central & Hudson River railroads until 1883, when he was appointed Chief Engineer of the New York, New Haven & Hartford Railroad Company.

Some of the principal works which he has been in charge of are: The Fourth Avenue Improvement, New York City; the construction of grain elevator, yards, docks, piers, sheds, and warehouses for the New York Central & Hudson River RR. between Fifty-ninth and Seventy-second streets on the Hudson River; the elimination of the grade crossings, building of new stations and the four-tracking of the New York, New Haven & Hartford Railroad between New York and New Haven; the double tracking of the line between New Haven and New London, the construction of the station at Providence, the elimination of the grads crossings in Westfield, Brockton and Boston, Mass.; the extension of the Boston & Providence RR. in Boston to the new terminal station, the construction of the six-track drawbridge over Fort Point Channel in Boston, and acting as Consulting Engineer in the construction of the new Boston Terminal.

—Last December we noted the death of Mr. Walter Shanly, at Montreal, in his eighty-first year. We are now able to give a few facts as to the career of this interesting man. He was born in Ireland in 1819 and came to Canada with his parents in 1836 and, for the most part, lived there continuously until his death. One who knew him intimately describes him as having been a tall and very handsome man, who gave an immediate impression to anyone meeting him for the first time, as to his real character—an impression which was always confirmed by an extended acquaintance. So fine and true was he, that in speaking of him it was a common thing to use one line of a popular song of forty years ago: "A fine ould Irish gentleman; one of the rale ould sort." Although he was an eminent engineer, it cannot be properly said that he was a great one; his chief attributes were a well-balanced mind and an absolute rectitude of purpose. This was so well recognized by those who knew him that he was described to Gov. Andrew of Massachusetts as one "whose judgment, even in a case where he might be personally interested, was to be preferred to that of most unbiased persons." It is therefore not strange that he should have been selected as arbitrator in many important contentions involving many millions of dollars. In fact, it was quite usual for two men who disagreed on the terms of some contract to say, "Let's leave it to Walter Shanly." And this meant far more than the bare idea conveyed by the words, because he never would consent to sit in an arbitration in conjunction with anyone else. His reliance on his own judgment was absolute and he required the same confidence of those who employed him.

Mr. Shanly had a wide railroad experience and might have attained an important place in the railroad world (for he was much such a man as the late Albert Fink) had it not been that he preferred the active practice of engineering; nevertheless he became General Manager of the Grand Trunk and remained so from 1858 to 1862.

Some idea of the magnitude of the work which he undertook in making a contract with the State of Massachusetts for the completion of the Hoosac Tunnel may be gained when it is recalled that the excavation had dragged along from 1855 to 1868 and was not then half done. Several contractors had failed, several had thrown up their contracts in disgust and all of them had more or less trouble with the authorities. The tunnel was flooded in many places, and by a fire which occurred in October, 1867, the central shaft and head-house were burned out. This entailed not only a large financial loss, but it also resulted in the death of thirteen men. So discouraged were the community at large and the State officers in particular that the bonds of the Tunnel Company were almost unsalable and it is said that only Mr. Shanly's personal credit carried the project through. It is interesting to recall that the estimate on which the work was started amounted to approximately $2,000,000. When the Shanly brothers (for Mr. Francis Shanly of Toronto was a partner in the enterprise) assumed the contract, $3,800,000, had already been spent and their tender was for $4,592,000 more; the final cost was reckoned at $10,000,000. Mr. Shanly began operations on April 1st, 1869, and completed his contract on November 22, 1874, at which time he effected a provisional settlement. It took Shanly Brothers five and one-half years to drive 15,693 ft. of headings; it took the Troy & Greenfield RR. and the State of Massachsetts fifteen years to drive 8,723 ft. This comparison furnishes some index to the man's energy and ability.

ELECTIONS AND APPOINTMENTS.

Canadian Pacific.—W. F. Tye has been appointed Chief Engineer of Construction. J. R. Sullivan has been appointed Chief Engineer of the Columbia & Western.

Carolina & Northwestern.—J. S. Booth has been appointed Master Mechanic, with headquarters at Chester, S. C.

Chicago, Burlington & Quincy.—H. C. Nutt, heretofore Assistant Superintendent of the Burlington & Missouri River at Sheridan, Wyo., has been appointed Assistant Superintendent of the C., B. & Q., with headquarters at Burlington, Ia.

Chippewa Valley & Northern.—The officers of this newly incorporated company are: President, D. J. Arpin, Grand Rapids, Wis.; Vice-President, A. M. Arpin, Bruce, Wis.; Secretary and Treasurer, E. P. Arpin, Grand Rapids, Wis., and Manager, W. R. McMillan of Bruce, Wis. (See RR. Construction column, March 2, p. 145.)

Clarion River.—W. W. Atwood, Superintendent of the Buffalo & Susquehanna, has been appointed Superintendent of the C. R., with headquarters at St. Mary's, Pa.

Cleveland, Cincinnati, Chicago & St. Louis.—L. L. Hyde, Assistant General Freight Agent, with headquarters at Cincinnati, O., has resigned.

Coronado.—E. Breitenstein, Secretary and Treasurer, has resigned.

Delaware, Lackawanna & Western.—Robert Dudgeon has been appointed Superintendent of the Buffalo Division, with headquarters at Buffalo, N. Y., succeeding J. B. Marston, resigned. Effective, March 17.

Denver & Rio Grande.—B. H. Hawkins has been appointed Master Mechanic, with headquarters at Denver, Col.

Fitchburg.—W. L. Stevenson, Superintendent at Boston, Mass., has resigned.

Florida Central & Peninsular.—At a meeting of the stockholders, E. St. John (Vice-President and General Manager of the Seaboard Air Line) was elected First Vice-President; John A. Henderson, Second Vice-President, and D. E. Maxwell, Third Vice-President. W. F. Cochran and E. Thalman were elected Directors, succeeding R. Fulton Cutting and M. Bayard Brown.

Illinois Central.—H. U. Wallace has been appointed Assistant Superintendent, with headquarters at Evansville, Ind., succeeding A. H. Egan, assigned to other duties. S. G. Hatch has been appointed Assistant General Passenger Agent, with headquarters at Chicago, Ill.

Little Rock & Hot Springs Western.—H. E. Martin, heretofore Auditor and General Manager of the Pine Bluff Arkansas River, has been appointed Auditor of the L. R. & H. S. W., with headquarters at Hot Springs, Ark.

Louisiana & Arkansas.—W. S. Smith, General Traffic Manager at St. Louis, Mo., has resigned.

Minnesota Transfer.—T. F. Hastings has been appointed Superintendent, succeeding Robert Dudgeon, resigned.

Missouri Pacific.—At a meeting of the stockholders held March 13, Russell Harding, James De Wolf Cutting and Frank J. Gould were elected Directors, succeeding D. K. Ferguson, Duncan D. Parmly and the late John G. Moore.

Frank J. Gould has been elected a Vice-President, a newly created office.

Pennsylvania Company.—W. D. Wiggins, Acting Assistant Engineer at Ft. Wayne, Ind., has resigned.

Peoria & Pekin Union.—At a meeting of the stockholders, held March 13, E. O. Hopkins was elected President, succeeding G. L. Bradbury and J. A. Barnard, Vice-President, succeeding C. H. Bosworth.

Pere Marquette.—G. M. Brown, Chief Engineer of the Saginaw District, with headquarters at Saginaw, Mich., has resigned.

Pine Bluff, Arkansas River.—G. L. Morris has been appointed General Manager, succeeding H. E. Martin, resigned.

Pittsburgh, Johnstown, Ebensburg & Eastern.—J. O. Reed has been appointed Superintendent, succeeding U. S. Houck, resigned. Mr. Reed's headquarters will be at Ramey, Pa.

Produce Shippers' Dispatch.—C. Alexander has been apointed General Manager, succeeding O. K. Mullins, resigned.

Ria Grande Southern.—George A. Marshall has been appointed Auditor, succeeding Cooper Anderson, resigned.

St. Louis Southwestern.—R. H. Bowron, heretofore Superintendent at Pine Bluff, Ark., has been appointed General Superintendent, with headquarters at Tyler, Tex., succeeding Mr. Britton.

Tombigbee & Northern (Successor to the Seaboard of Alabama).—George F. Montgomery is General Manager; C. W. Ogden, Secretary and Treasurer; J. M. Van Deusen, Superintendent, and Frank Casper, Superintendent of Transportation.

Weatherford, Mineral Wells & Northwestern.—W. C. Forbes, General Freight and Passenger Agent at Weatherford, Tex., has resigned.

RAILROAD CONSTRUCTION.
New Incorporations, Surveys, Etc.

ALABAMA ROADS.—A coal road nine miles long is being surveyed from Oneonta to the Underwood coal mines.

ATCHISON, TOPEKA & SANTA FE.—The W. R. Stubs Construction Co. of Lawrence has taken the contract for the section from Guthrie, Okla., northwest to the Kingfisher County line on the extension building by this company and the Chicago, Rock Island & Pacific from Guthrie northwest 25 miles to Kingfisher. (C., R. I. & P., March 9, p. 161.)

BALTIMORE & OHIO.—Two companies have been incorporated in West Virginia in the interest of this company to build cut-offs; the Fish Creek, with a capital of $3,000,000, to build from Littleton, Wetzel County, to Moundsville, Marshall County, and the Patterson Creek & Potomac, with a capital stock of $10,000,000, to build from the mouth of Patterson Creek in Mineral County, to a point on the North Creek of the Potomac near Short Gap.

Surveys are reported completed for an extension of the Salisbury Branch from Niverton, Pa., to run south along the east bank of the Castleman River to a point about nine miles south of Grantsville, Md. Jennings Bros., of Philadelphia, who have bought mineral and timber lands near Grantsville, are said to be interested.

Contracts are let for double tracking 38 miles on the Chicago Division between Fostoria, O., and Attica, and between Hicksville and Auburn Junction. (Nov. 24, 1899, p. 818.)

BAYFIELD, SUPERIOR & MINNEAPOLIS.—This company was incorporated in Wisconsin March 14, with a capital stock of $100,000, to build a railroad from Bayfield west to Superior, and thence southwest through Wisconsin to St. Paul. The incorporators are: John A. Rice, of Merton; John L. Lamb, Bayfield; Harry Whigman, Raton, N. M.; George Lines and George A. West, Milwaukee.

CALIFORNIA & NORTHERN.—This company was incorporated in California March 5, with a capital stock of $2,500,000, to build a railroad from Eureka to run north about 90 miles to Crescent City. The incorporators are: Charles Nelson, Francis Korbell, P. L. Lilienthal and John L. Koster, San Francisco, Cal.; D. B. Lyman, P. L. Flanigan and Oscar J. Smith, Reno, Nev.

CALIFORNIA NORTHWESTERN.—Amended articles of incorporation have been filed in California to build the proposed extension from Cloverdale northwest about 60 miles to Christine, Mendocino County. About $260,000 have been subscribed for the extension. (March 17, p. 177.)

CALVERT, WACO & BRAZOS VALLEY.—An amendment has been filed to the charter of this company to extend its line from Lewis Switch, Tex., southeast 25 miles to Bryan. The road was built from Lewis Switch north to Calvert, 15½ miles, last year. (Oct. 13, 1899, p. 719.)

CANADIAN PACIFIC.—Surveys are in progress for a cut-off from Arnprior, Ont., to run east paralleling the Ottawa River to Ottawa. The company's route is a roundabout line by way of Carleton Junction.

CANADIAN ROADS.—Ce LeB. Miles, C. E., is surveying for a railway from Bristol to Foreston, N. B., about 15 miles. The road will be used to transport lumber.

CENTRAL NEW ENGLAND.—This company, which has completed its extension from Tariffville, Conn., northeast 14.35 miles to Springfield, Mass., proposes to straighten its track and reduce grades on certain portions of the old line, and also to replace a number of bridges. A new Y is being built at Tariffville for the Springfield Branch. (Nov. 17, 1899, p. 800.)

CHICAGO, BURLINGTON & QUINCY.—Preliminary surveys have been made in Macon County, Mo., for reduction of grades on the Hamilton & St. Joseph between New Cambria and Macon. It is proposed to reduce to 35 ft. to the mile.

CHICAGO, ROCK ISLAND & PACIFIC.—The company is making surveys for a cut-off from Belknap, Ia., southwest to Trenton, Mo., but no action has been taken as to building and the surveys are not completed. (Official.)

COMOX & CAPE SCOTT.—The Dominion Parliament Railway Committee has amended a bill granting this company a charter to build a railroad on the island of Vancouver, B. C., which reduces the capital stock from $10,000,000 to $6,000,000. The company has bonding privileges to the extent of $20,000 per mile.

COSHOCTON & SOUTHERN.—This road is to be rebuilt. See General Railroad News column.

EAST TENNESSEE & WESTERN NORTH CAROLINA.—Stockholders have voted to extend this line from its present terminus at Cranberry, N. C., southeast about 75 miles via Morganton to Lincolnton.

ESCANABA & LAKE SUPERIOR.—See Railroad News column.

FARGO, DULUTH & NORTHWESTERN.—This company was incorporated in Minnesota March 17, to build a railroad from a point on the Minneapolis, St. Paul & Sault Ste. Marie, probably at Elbow Lake, to run northwest through Fargo, N. D., and thence through Cass, Traill, Steele, Nelson and Ramsey counties, N. D., with another line from Fargo northeast to Duluth. The Minneapolis, St. Paul & Sault Ste. Marie is said to be back of the project. The incorporators are: Mayor Johnson, of Fargo; President Von Neida, of the Red River Valley National Bank; Vice-President L. I. Lewis, Contractor Kennedy and Dr. S. T. Satterthwait. (M., St. P. & S. St. M., Jan. 5, p. 14.)

GREAT NORTHERN.—Surveys are reported in progress for an extension of the old Sioux City, O'Neill & Western from the western terminus at O'Neill, Neb., to run west about 250 miles to Alliance on the Chicago, Burlington & Quincy.

GULF & MANITOBA.—The company has filed a notice with the Minnesota State Railroad Commission to increase its capital stock from $50,000 to $7,000,000, with the intention of extending its line from Duluth south 700 miles through Minnesota and Iowa to Kansas City. The company is building in the vicinity of Beaver Falls, Minn. Frank T. Campbell is President. E. E. Carpenter of Canton, S. D., is an incorporator. (Dec. 8, 1899, p. 853.)

HELENA, TUPELO & DECATUR.—Contracts are closed, according to report, for this new line from Arkansas City, Ark., east 225 miles through Tupelo, Miss., and Moulton, Ala., to Decatur. The road is to be bonded for $5,000,000. H. C. Medford of Tupelo is Acting President, and E. C. Finley, Wharton, Tex., Chief Engineer.

LEHIGH VALLEY.—Riebe & Sons have begun work on their contract to improve the railroad yards at East Mauch Chunk, Pa.

MABERRY, COTTON PLANT & WHEATLEY.—This company was incorporated in Arkansas March 10, with a capital stock of $75,000, to build a railroad from a point on the east bank of Cache River near Maberry, Woodruff County, to run east 13 miles via Cotton Plant and Jent to Wheatley. The directors are: L. B. Moore, W. R. Spivey, R. C. Lynch, R. T. Jordan, B. A. Trice, W. S. Crofford, W. S. Fespernon, Will T. Trice, C. D. Anderson and J. W. Anderson, all of Woodruff County.

MINERAL.—A bill has been introduced in the Dominion Legislature by Mr. Beatty of Parry Sound to incorporate this company, with a capital stock of $1,000,000, to build a railroad from Gros Cap Harbor,

Ont., on the north shore of Lake Superior, to run northeast to a point on the C. P. R. The incorporators are: Samuel Mather, Henry G. Dalton, William P. Murray and James W. Hoyt, Cleveland, O.; Arthur E. Ely, Wheaton, Ill.

MISCELLANEOUS COMPANIES.—The Kansas City & Oklahoma Construction Co. was incorporated in Missouri March 8, with a capital stock of $200,000, to build railroads, bridges and other works. Among the incorporators are Chas. H. Atkinson, Kansas City, Mo., and Wm. C. Edwards, Larned, Kan.

NEW YORK, AUBURN & LANSING.—This company was incorporated in New York March 6, with a capital stock of $400,000, to build a railroad from Aurelius, Cayuga County, on the New York Central, to run south 25 miles to Lansing, Tompkins County. The principal office is New York City. The directors are: Marcus W. Conkling and John D. Browne, 1123 Broadway, New York; Charles Roblee, 865 Union St., Brooklyn; John F. Schipper, 90 South St., Mt. Vernon; R. L. Smith, 134 West 109th St., New York; M. W. Murdock, Venice Center, N. Y.; C. A. Morgan, Merrifield, N. Y.; T. A. McCrea, Auburn, N. Y.; John Snyder, Scipio, N. Y.

NEW YORK CENTRAL & HUDSON RIVER.—An officer writes that the Oswego & Rome does not contemplate an extension at Oswego, as reported. (March 16, p. 178.)

NEW YORK, NEW HAVEN & HARTFORD.—About 150 men are reported at work enlarging the freight yards at Poquonoc, Conn. Some 10 miles of additional tracks will be laid.

Plans are reported completed for abolishing grade crossings at Pawtucket, R. I.

OREGON MIDLAND.—A contract is reported let to men in Chicago for grading and tracklaying on the proposed 72 miles of its line from Klamath Falls, Ore., southwest to the Southern Pacific near the State line. L. W. Van Horn of Ashland, Ore., is Vice-President and General Manager. (Feb. 23, p. 128.)

OSWAYO VALLEY.—This company was incorporated in New York March 16, with a capital stock of $40,000, to build a railroad from Mersereau & Co.'s mills at Portville, Cattaraugus County, to run east four miles to Ceres, Allegany County. The principal office is Portville. The directors are: Wm. B. Mersereau, Eugene Leavens, Wm. E. Wheeler, Myron D. Carr, W. E. Wainman, Nicholas Hotton, I. L. Fox and Anthony Hotton, all of Portville.

PENNSYLVANIA.—Joseph Crawford, Chief Engineer of the Pennsylvania & Buffalo Connecting, has submitted a report to Samuel Rea, the President, based on partial surveys, in which he states that it will cost about $4,000,000 to build the line from Wilcox, Pa., north 102 miles to Buffalo, N. Y. He estimates the cost of the terminals at Buffalo at $1,000,000. (P. & B. C., March 9, p. 130.)

An extension is contemplated, according to report, from the Turtle Creek Valley line to run north about 17 miles to the Allegheny Valley to Parnassus, Pa.

Surveys are reported in progress for an extension of the branch from Crabtree, Pa., north about six miles to New Alexandria.

Surveys are reported being made for a cut-off from the Radebaugh tunnel, to run west directly to Irwin, Pa. This would place Jeannette some distance off the main line.

Chas. H. Sims & Co. are reported to have the contract for shortening a heavy curve east of Thompsontown, Juniata County, Pa.

PHILADELPHIA & READING.—Steam shovels have begun work on the culm banks south of Tamaqua, Pa., to make room for five additional tracks, each about 4,000 ft. long.

Improvements are proposed on the line between Hamilton and Trenton Junction, N. J., including over four miles of sidetracks. Bids for the masonry work have been submitted.

QUINCY, CARROLLTON & ST. LOUIS.—The General Manager writes that so far as he knows there is nothing in the report that his road is to be extended from Barnett, Ill., to Litchfield, as stated recently. (March 9, p. 162.)

ST. LOUIS & SAN FRANCISCO.—This company has been reincorporated in Texas preparatory to building the extension already mentioned in this column, into Denison, Tex., as a part of the new road from Sapulpa, I. T. (Feb. 23, p. 128.) See Kansas City, Osceola & Southern in General Railroad News Column.

SEABOARD AIR LINE.—An officer writes that there is no truth in the report that the company is having surveys made for a branch to run to Dahlonega and Clarksville, Ga. (March 9, p. 162.)

SOUTHERN.—The company has appropriated $1,000,000, according to report, to make the proposed improvements between Asheville, N. C., and Morristown, Tenn. Contracts were to be awarded this week. (Dec. 22, 1898, p. 888.)

SOUTHERN MISSOURI & ARKANSAS.—President Erb has made a proposition to the people of Poplar Bluff, Mo., that if they will furnish terminals and right of way through the city, and $50,000 in freight and passenger certificates to be subscribed by May 1, the company will build a line from a point near Puxico, Mo., to run southwest about 15 miles to that city, to be completed by Jan. 1, 1901. The company proposes ultimately to extend its line to New Orleans. It connects with the Illinois Central by boat at Cape Girardeau. (May 26, 1898, p. 379.)

SOUTHERN PACIFIC.—Side tracks are being laid at Stockton, Cal., to the site of a proposed cannery on Hazelton Ave.

SUMPTER VALLEY.—C. W. Nibley, General Manager, is reported as stating that the company will extend its line from Sumpter, Ore., south 18 miles through Bonanza toward Prairie City, and that the section to Canyon City will be built if negotiations now pending in New York are consummated. (Oct. 20, 1899, p. 738.)

TEXAS CENTRAL.—Preliminary surveys are in progress for a branch from Dublin, Tex., north about 30 miles to Thurber on the Texas & Pacific. The citizens of Stephenville are trying to have the route changed to the eastward to run through their town.

TEXAS MIDLAND.—This company, according to report, will extend its line from Ennis, Tex., southwest about 400 miles to Alligator Point on the Gulf.

UNION PACIFIC.—Bids are being received, according to report, for cutting down Sherman Hill west of Cheyenne, Wyo. The estimated cost is about $2,000,000.

UNIONTOWN, WAYNESBURG & WEST VIRGINIA.—Wm. C. Jutte, of the firm of C. Jutte & Co., Pittsburgh, the principal promoter of this line, is reported as stating that building will probably be begun July 1. The line is projected from Uniontown, Pa., west 80 miles via Waynesburg to Wheeling, W. Va. The estimated cost is $4,000,000. (Feb. 9, p. 96.)

VIRGINIA NORTHERN.—Grading is completed for this line of the Shenandoah Furnace Co. of Shenandoah, Va., from Shenandoah north six miles to Massanutton. The rails and rolling stock are already bought. (Virginia Roads, March 2, p. 146.) W. L. Sims is General Manager, and J. M. Fitzgerald, Traffic Manager, both of 71 Broadway, New York. (Official.)

WISCONSIN CENTRAL.—An officer writes with reference to the report that the company will spend $2,000,000 this year in cutting down grades, that the company does not intend to spend such amount. There will be some track improvement work done this season.

GENERAL RAILROAD NEWS.

BIRMINGHAM, SELMA & NEW ORLEANS.—A report from Selma, Ala., states that this 20-mile railroad has been sold to F. M. Abbott of West Point, Miss., as a representative of New York capitalists. The authorized capital is $1,000,000.

BOSTON & MAINE.—Judge Edgar Aldrich, referee, decided against the State of New Hampshire in the suit to recover $650,000 from the Manchester RR., obtained in June, 1895, in litigation with the Concord RR., by the M. & L. The referee decided that to recover, the State must prove that the stockholders have received 10 per cent. a year from the beginning.

BROOKLYN RAPID TRANSIT.—The 999-year lease of the Nassau Electric RR. to the Brooklyn Heights Co has been filed with the Secretary of State. The lease provides that the lessee must pay the interest on the bonds and a sum not less than 4 per cent. on the $6,500,000 preferred stock of the Nassau. Of the total preferred stock of the Nassau Co., $6,052,000 is owned by B. R. T.

CHICAGO & ALTON.—Interest to April 15 at the rate of 4 per cent. per annum will be paid on the purchase money certificates issued by the United States Trust Co., under the syndicate agreement of March 2, 1899, on and after April 16, at the office of the Trust Co.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—Samuel Felton has been formally discharged as receiver of this line. His report was filed on Jan. 9 and the property was taken from his hands on Sept. 30, 1898. (Jan. 12, p. 30.)

COLORADO & SOUTHERN.—It is stated that negotiations are pending for the acquisition of the Colorado Midland, which will probably be sold soon, and that both lines will then be connected.

COLUMBUS, SANDUSKY & HOCKING.—It is stated that an appeal will be taken from Judge Taft's decision to the U. S. Circuit Court of Appeals in Ohio, so as to delay the sale of the property until fall. (March 16, p. 178.)

COSHOCTON & SOUTHERN.—Robert Blickensderfer has been appointed Receiver by Judge Taft of the United States Court, succeeding J. W. Wardwell. Mr. Blickensderfer is President of the Wheeling & Lake Erie, which has acquired most of the bonds of the C. & S. The road has not been operated for about a year and is in need of much repairing. Work is to be begun on the road to have it in operation to Zanesville this spring.

ESCANABA & LAKE SUPERIOR.—Press reports from Menominee, Mich., state that the Chicago, Milwaukee & St. Paul has acquired running powers over this road which runs from Escanaba, Mich., to Watson, 35 miles, and was built in 1898. It is stated that the road will be extended to Channing, Mich., about 40 miles, to connect with the main line of the St. Paul.

FITCHBURG.—W. Seward Webb and George W. Phillips filed a bill in equity in the United States Circuit Court at Boston on March 16 against the Boston & Maine and the Fitchburg, together with Governor Crane and other State officers, to restrain the execution of the proposed lease of the Fitchburg to the B. & M., and to restrain the voting for such purposes of the 50,000 shares of common stock held by the State. The injunction was refused on March 19 by Judge Colt. (March 2, p. 162.)

FORT WAYNE, TERRE HAUTE & SOUTHWESTERN.—This property was sold at public auction at Brazil, Ind., March 15, by Noble C. Butler, Special Master, to Harry Crawford, President of the Chicago & Southeastern, for $30,000. The road is controlled by the C. & S. E. (Feb. 9, p. 96.)

ILLINOIS CENTRAL.—The United States Supreme Court has decided adversely to the suit for an injunction restraining the city of Chicago from interfering with the rights of this company to fill in for railroad purposes certain lands submerged by Lake Michigan in Chicago, Ill., between Twenty-fifth and Twenty-seventh Sts.

KANSAS CITY & SOUTHERN.—This company was incorporated in Missouri March 20, with a capital stock of $51,000,000, as successor to the Kansas City, Pittsburgh & Gulf, as noted below. The incorporators are: John W. Gates, Max Pam, W. Edenborn, and John J. Mitchell of Chicago; E. H. Harriman and Otto H. Kahn of New York; James Hopkins, Alfred Clifford, and Julius S. Walsh of St. Louis; Silas W. Pettitt and William F. Harrity of Philadelphia; Isaac L. Elwood of De Kalb, Ill., and John Lambert of Joliet, Ill.

KANSAS CITY, OSCEOLA & SOUTHERN.—This company, the sale of whose property to the St. Louis & San Francisco was noted last week (p. 178), will turn over the property and the cash to meet the cost of rebuilding the line, and the St. L. & S. F. will issue its divisional mortgage bonds secured on the property for $3,300,000. Of these bonds about $2,000,000 will be 4 per cent., and about $1,000,000 3 per cent. The $300,000 will be reserved for the future.

KANSAS CITY, PITTSBURGH & GULF.—This property was sold at public auction at Joplin, Mo., March 19 by E. H. Stiles, Master in Chancery, to Silas W. Pettit, representing the Philadelphia reorganization committee. There was but one bid, $12,500,000, which was the upset price. The sale was made to satisfy the mortgage of the State Trust Co., New York. (March 9, p. 162.) See Kansas City & Southern above.

MOBILE & OHIO.—The M. & O. are considering the acquisition of the $6,500,000 St. Louis & Cairo stocks so as to control that property at a fixed charge rather than as now on a basis of a percentage of the gross earnings. The St. L. & C. is leased to the M. & O. for 45 years from Feb. 1, 1886, the rental being 25 per cent. of 150/640 of the gross receipts of the railroad between Mobile and Cairo. Under the new plan this lease would be disposed of. It is proposed to issue collateral trust 30-year 4 per cent. gold bonds for $2,500,000 in exchange for the St. L. & C. stock, 30 shares of the latter to be exchanged for $1,000 of the new bonds. The remainder of the new bonds will be used for future requirements.

NORFOLK & SOUTHERN.—This company's additional first mortgage bonds for $520,000 have been listed by the New York Stock Exchange. These bonds were issued to pay for the 41 additional miles of single track road and equipment of the Norfolk, Virginia Beach & Southern acquired by this company. At the time of the sale of this property to the N. & S., $254,000 outstanding bonds of the N., V. B. & S. were redeemed and the total issue of $750,000 was cancelled.

OHIO SOUTHERN.—The holders of the second mortgage bonds of this company have won their suit against the Central Trust Co., securing equal participation with the first mortgage bondholders in any proceeds received from the sale of the property. It is claimed that first mortgage bonds issued on the 67-mile extension from Springfield to Lima, and so far as that mortgage effects that portion of the road, are illegal.

PENNSYLVANIA.—A proposition for consolidating the North & West Branch Railway Co., the Pennsylvania, Schuylkill Valley RR. Co., the Sunbury, Hazleton & Wilkesbarre Ry. Co., the Sunbury & Lewistown and the Nescopec RR. Co. into one corporation, has been favored by the Pennsylvania for some time and the respective companies will be asked to take the matter under consideration with a view of making the same effective. All these companies are subsidiary lines of the Pennsylvania and each has a separate set of officers.

The Pennsylvania Supreme Court on March 12 handed down a decision overruling that of the lower Court in the case of Wolf vs. Pennsylvania RR. and the Philadelphia & Erie, and deciding against the P. & E. minority stockholders in their suit to obtain an accounting.

At the annual meeting last week the directors were authorized to issue the remaining portion of the capital stock, which, under the charter, is limited to $151,700,000. With the new 10 per cent. issue already authorized, this leaves about $6,700,000 to be issued at the discretion of the directors.

PITTSBURGH & CASTLE SHANNON.—This property has been sold to a syndicate represented by Robert McD. Lloyd. It runs from Pittsburgh, Pa., to Arlington, 6.5 miles.

ST. LOUIS, PEORIA & NORTHERN.—Special Master in Chancery Bluford Wilson, at the shops of this company in Springfield, Ill., on March 15 sold the properties of the railroad and the coal companies. This was in the foreclosure suit of the Central Trust Co. of New York on bonds amounting to $2,960,000. The St. L., P. & N. north of Springfield was bid in by L. L. Stanford of New York for $1,350,000. The railroad south of Springfield, including the properties of the Madison Coal Co., was bid in by Frederick B. Voorhees of New York for $1,400,000.

SEABOARD AIR LINE.—W. L. Marbury of Baltimore, and D. L. F. Groner of Norfolk, Va., counsel for Thomas F. Ryan of New York, appeared before Judge Edmund Waddill, Jr., in the United States District Court of Norfolk, Va., on March 15, and asked that a Special Master be appointed to take testimony in support of the plaintiffs' allegation praying that the defendants be restrained from effecting the consolidation. The matter was taken under advisement by the Court. (March 9, p. 162.)

SOUTHERN.—The Central Trust Co. of New York will receive proposals until March 26 for $53,244.75 of the Richmond & Danville equipment 5 per cent. mortgage bonds dated Sept. 3, 1889.

SOUTHWESTERN ARKANSAS & INDIAN TERRITORY.—The property of this company was bought at the foreclosure sale at Smithton, Ark., March 13, with the property of the Smithton Lumber Co., by Murray Carlton of St. Louis, Mo., for $160,000. (Nov. 17, 1899, p. 802.)

TENNESSEE COAL IRON & RAILROAD.—At the annual meeting of the stockholders held March 14, the President recommended the issue of $3,000,000 new common stock, of which $1,800,000 is to be used to retire the $1,000,000 preferred stock outstanding, and the remaining $1,200,000 to reimburse the treasury for advances made in acquiring new property. (Feb. 23, p. 128.)

THIRD AVENUE (NEW YORK).—Hugh J. Grant has been appointed permanent Receiver. Mr. Grant as temporary Receiver last week submitted his preliminary report to Judge Lacombe of the United States Circuit Court, which summarizes the company's indebtedness, funded, unfunded and contingent. (March 9, p. 162.)

Official announcement is made that a controlling interest in the capital stock of the Third Avenue has been bought in the open market by the Metropolitan St. Ry., which gives that company entire control of all the surface roads of the city. This purchase will have no present effect upon the receivership except to hasten the road's rehabilitation. Judge Lacombe on March 19 appointed Arthur H. Masten, of New York, as Standing Master. On the same day Mr. Grant was appointed temporary receiver of the Forty-second Street, Manhattanville & St. Nicholas Avenue, a subordinate line, on complaint of the Lorain Steel Co. of Ohio.